Section 1

Introduction

AFP 14X-3
X-Ray Processor

AFP 14X-3
X-Ray Film Processor

Table of Contents

Section 1 - Introduction

Application	1-1
Purpose of this Manual	1-2
Description	1-2
References	1-2
Installation & Pre-Installation	1-2
Dimensions	1-3
Darkroom Requirements	1-4
Ventilation	1-4
Electrical Requirements	1-5
Plumbing Requirements	1-5
Wash Water Recirculation Kit	1-5
General Specifications	1-7

Section 2 - Installation

Introduction	2-1
Pre-Installation	2-2
Location	2-2
Power Requirements	2-4
Plumbing	2-4
Wash Water Recirculation Kit	2-4
Installation	2-5
Unpacking	2-5
Position Processor	2-5
Level Processor	2-7
Connect Water Supply	2-7
Connect Drains	2-8
Connect Silver Recovery Unit	2-9
Install Replenishment Tanks	2-10
Connect Power	2-11
115 VAC Power	2-11
220 VAC Power	2-12
50 Hz Operation	2-12
Adjust Squeegee Rollers	2-13
Processor Check-Out	2-14
Check Replenishment	2-17
Select Replenishment Mode	2-18
Final Check-Out	2-19
Install Daylight Loading Hood	2-19
Complete Installation	2-19

PRINTED IN U.S.A.
© 1989
10/23/89.

Index

Section 3 - Operation

Capability 3-1
References 3-1
General Description 3-2
Panel Removal 3-2
Processing Systems 3-4
    Film Transport System 3-4
    Circulation & Agitation 3-5
    Solution Heating & Tempering 3-6
    Replenishment 3-9
Drains 3-9
Controls & Indicators 3-10
Daily Operation 3-12
    Start-Up 3-12
    Processing Film 3-13
    Shut Down 3-14
    Film Jams 3-14
Film & Chemistry Problems 3-15
    Film Artifacts 3-15

Section 4 - Maintenance

Maintenance Program 4-1
Maintenance Records 4-1
    Cleaning 4-1
    Lubrication 4-1
Maintenance Schedule 4-2
    Weekly Cleaning 4-3
    Monthly Cleaning 4-3
Changing Chemistry 4-4
Developer Filter Service 4-6
Algae Control 4-7
Lubrication 4-8
    Removing Old Lubricants 4-8
    Lubrication Schedule 4-8
    Lifetime Lubricated Parts 4-9

Section 5 - Service

Table of Contents 5-I
    Illustrations 5-II
Technical Specifications 5-III
Long Term Storage & Inspection 5-V
Composite View(s) 5-VI
Service Information 5-1/5-70
Wiring Diagrams 5-71
    Node Identification 5-71
    Wire Numbering System 5-72
    Schematics 5-75/5-83

Section 6 - Parts

Illustrated Parts Breakdown 6-1
  Application 6-1
  How Parts Are Listed 6-1
Table of Contents 6-2
Parts Illustrations 6-3/6-50

Section 7 - Accessories

Wash Water Recirculation 7-2
Daylight Loading Hood 7-7

Section 8 - Technical Bulletins

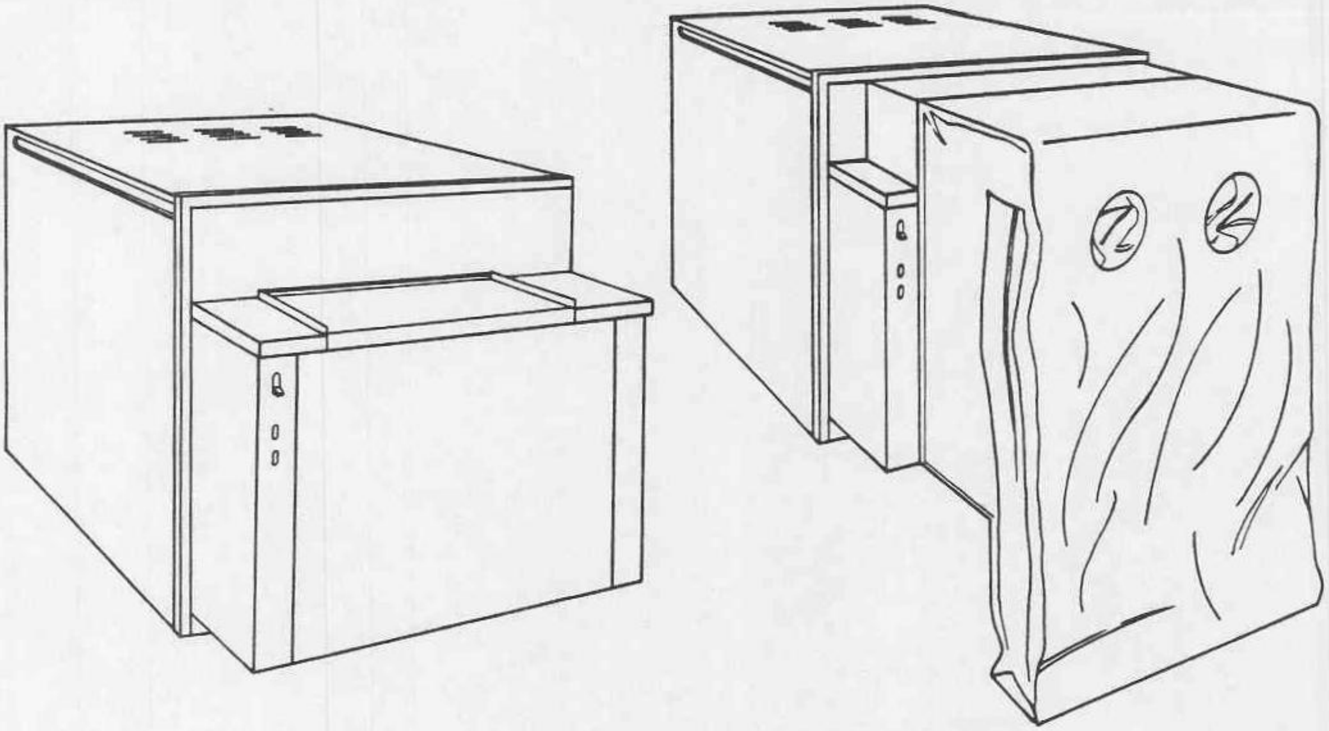
Illustrations

Illustration	Figure No.
AFP 14X-3 Processor	1-1
Processor Dimensions	1-2
Wall Cut-Out Dimensions, Front	1-3
Wall Cut-Out Dimensions, Side	1-4
General Specifications	1-5
AFP 14X-3 Processor Dimensions	2-1
Processor with Darkwall Panels	2-2
Through the Wall Options	2-3
Darkwall Panel Installation	2-4
Rear Panel Latch	2-5
Processor Leveling Points	2-6
Plumbing Connections	2-7
Silver Recovery Connections	2-8
Replenishment Connections	2-9
115 VAC Plug Configuration	2-10
Drive Chain & Sprockets	2-11
Squeegee Roller Adjustment	2-12
Developer & Dryer Temp. Controls	2-13
Film Detector Fingers	2-14
Replenishment Select Switch	2-15
AFP 14X-3 Processor	3-1
Top Cover Latch Location	3-2
Rear Cover Latch	3-3
Film Feed Detector Fingers	3-4
Drain Manifold	3-5
Developer Heater	3-6
Front Dryer Safety Switch	3-7
Lift Out Dryer Safety Switch	3-8
Circulation System	3-9
Controls & Indicators	3-10
Top View, Cover Removed	3-11

Illustrations (Continued)

Illustration	Figure No.
Maintenance Schedule	4-1
Squeegee Roller Adjustment	4-2
Drive Motor	4-3
Drive Shaft	4-4
Wet Section Rack	4-5
Dryer Rack	4-6
Section V Illustration Index	5-II
Section VI Illustration Index	6-2

Notes:



Film Tray Version

Daylight Loading Version

Figure 1-1, AFP 14X-3 Processor

Application

The contents of this manual applies to the following versions of the *AFP 14X-3* X-Ray Film Processor:

U.S. Air Force	**FSN:**	**6525-01-162-8249**
U.S. Army	**FSN:**	**6525-01-220-5079**

These units are identical in operation and service except that those units designated for the U.S. Army are equipped with a Daylight Film Loader as standard equipment. Those designated for the U.S. Air Force units are equipped with a standard film feed tray.

Both of the above mentioned versions of the *AFP 14X3* processor are shipped with a **Wash Water Recirculation Kit** that may be used in lieu of permanent plumbing connections, dependent on the needs of the specific installation.

Other differences that may exist between the two models will be specified as they occur.

NOTE: All specifications in these instructions are subject to change. For additional information please contact AFP Corporation, Elmsford, NY (914) 592-6100.

Purpose of this Manual

This manual provides information on the following topics pertaining to the *AFP 14X-3* processor.

Specifications & Applications
Pre-Installation and Installation Procedures
Processor Operation
Preventive Maintenance
Service and Repair Procedures
Identifying & Ordering Spare Parts

Description

The ***AFP 14X-3*** is a tabletop X-Ray film processor which processes and dries RP-type medical x-ray films in sizes from 4 X 4 in (10 X 10 cm) to 14 X 36 inches (36 X 91 cm.) It has the capacity of processing up to 120 14 X 17 inch (35 X 45 cm.) sheets per hour.

References

All references as to direction (right, left, front and rear) are from the operators point of view when loading film into the processor. The control panel is considered the "Front" of the processor, the receiving bin the "Rear".

Consumable Product Specifications

Consult with the sensitized products manufacturer regarding quality control procedures, chemical mixing procedures, solution temperatures, developing time, replenishment rates and film handling procedures.

Installation & Pre-Installation

The following information is an **overview** of pre-installation and installation requirements. Refer to **Section 2, Installation** for complete pre-installation preparation and installation requirements.

Dimensions

Figure 1-2 illustrates the dimensions of the processor.

Approximately 24 inches of free space should be provided around the processor to allow access for routine cleaning, preventive maintenance, service and repairs. If necessary, due to space limitations, the left side of the processor may be installed against a wall.

Base

The ***AFP 14X-3*** processor is designed to be positioned on a sturdy counter or table. Adequate room for replenisher tanks must be provided beneath the processor or nearby. The optional Base Cabinet accessory (p/n 525-180-13) provides such as support and storage for replenishment chemicals as required.

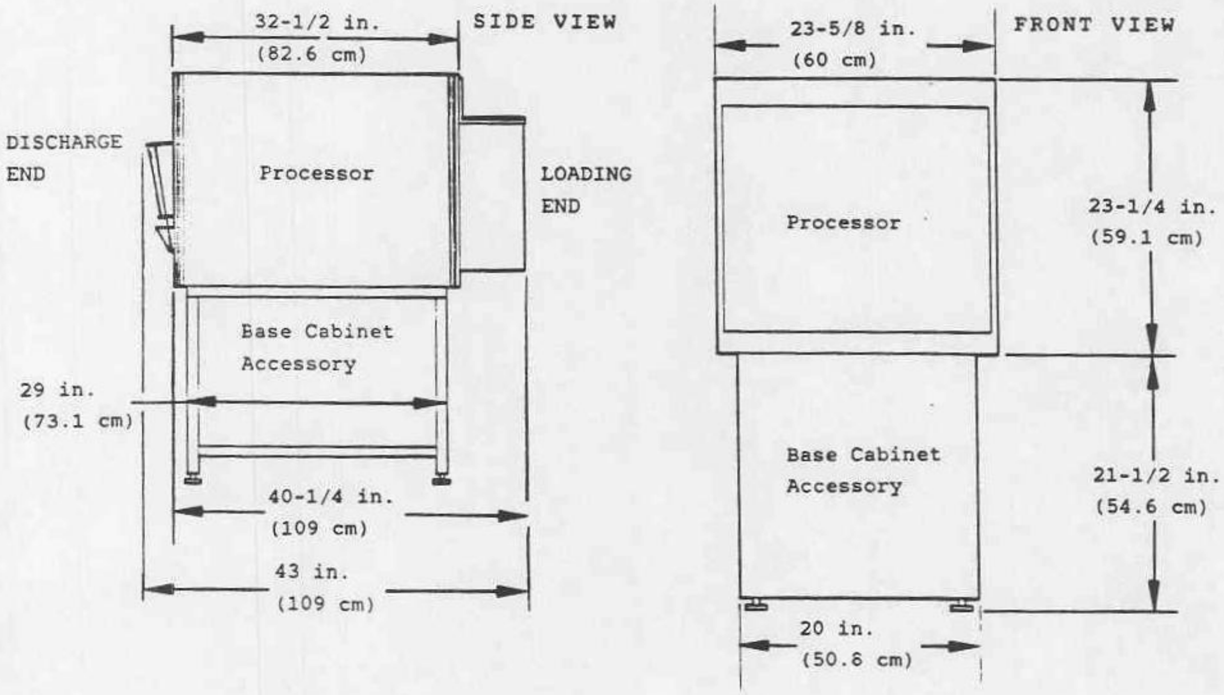

32-1/2 in.
(82.6 cm)
SIDE VIEW
DISCHARGE END
Processor
LOADING END
Base Cabinet Accessory
29 in.
(73.1 cm)
40-1/4 in.
(109 cm)
43 in.
(109 cm)
23-5/8 in.
(60 cm)
FRONT VIEW
Processor
23-1/4 in.
(59.1 cm)
Base Cabinet Accessory
21-1/2 in.
(54.6 cm)
20 in.
(50.8 cm)

Figure 1-2, Dimensions

Floor

The floor beneath the processor must be sturdy and should be covered with a waterproof material to prevent absorption of spilled chemicals and water.

The floor must support the full operating weight of the processor (535 lbs. [243 kg]) and be level within 1/2" over the area utilized by the processor.

Darkroom Requirements

The *AFP 14X-3* processor is designed for installation either entirely within a darkroom or as a through-the-wall installation with the feed tray in a darkroom and the receiving bin located in a normally lit area such as a film reading area.

If the processor is to be installed through-the-wall, the *Darkwall Panel Accessory* (p/n 525-18014), which can be attached to either the feed tray or receiving bin end of the processor, is recommended to ease installation.

Figures 1-3 and 1-4 illustrate dimensions required for a wall cut-out for through-the-wall installation.

Ventilation

To prevent build-up of chemical fumes that may be hazardous to processor and/or operators, the darkroom must be adequately ventilated. It is recommended that a complete air change take place at least once every 15 minutes.

To provide immediate processing capabilities the *AFP 14X-3* is designed to be turned on approximately 15 minutes before first daily use and then be left on all day.

When operated in this manner the processor will add approximately the following load to the surrounding air:

Mode	Measurable	Non-Measurable	Total
Standby	1272 Btu/Hr	1502 Btu/Hr	2774 Btu/Hr
Operate	2383 Btu/Hr	2629 Btu/Hr	5013 Btu/Hr

It is recommended that the darkroom heating, ventilation and air conditioning system be adjusted to compensate for this additional load.

Electrical Requirements

CAUTION: All electrical connections to the processor must be made by a qualified service person or electrician. All connections must conform with existing local and national electrical codes. The processor must be provided with a verified ground before operation.

AFP 14X-3 processors are shipped configured for 115 VAC, 60 Hz. operation. Provision is made for on-site reconfiguration to 220 VAC operation as well as 50 or 60 Hz operation.

Plumbing Requirements

Water Supply: The processor will require a tempered water supply between 65-90 degrees with an available flow rate of 2 gallons per minute

Drain: A floor drain with a capacity of 3 gallons per minute must be within 6 feet of the processor. The drain must not contain any copper pipes as photographic processing chemicals will quickly damage or destroy them.

NOTE: All drain installations must be in compliance with local and federal EPA requirements and guidelines. If you are unsure of your local requirements please contact the nearest EPA office.

Wash Water Recirculation Kit

U.S. Air Force and U.S. Army *AFP 14X-3* processors are shipped equipped with the External Wash Water Recirculation Kit, p/n 999-2301-702.

If this kit is used there is no requirement for external plumbing connections other than a water source to fill the 30 gallon water reservoir and a facility for draining the reservoir.

Installation instructions for the External Wash Water Recirculation Kit may be found in Section 7, Accessories.

Dimensions

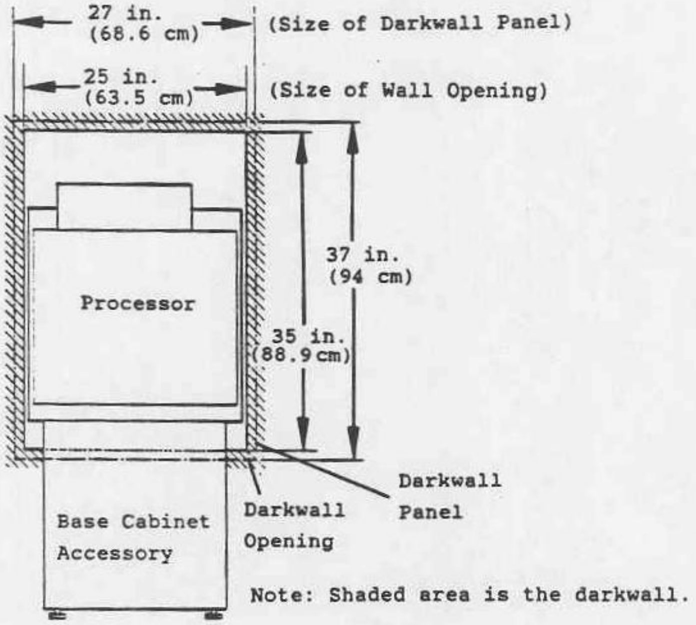

27 in.
(68.6 cm)
(Size of Darkwall Panel)
25 in.
(63.5 cm)
(Size of Wall Opening)
37 in.
(94 cm)
Processor
35 in.
(88.9 cm)
Darkwall
Panel
Base Cabinet
Accessory
Darkwall
Opening
Note: Shaded area is the darkwall.

Figure 1-3, Wall Cut Out Dimensions, Front View

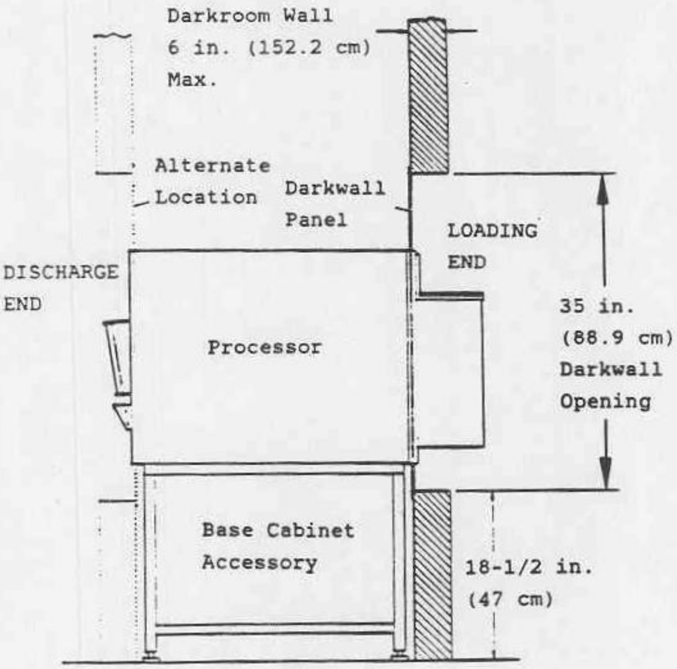

Darkroom Wall
6 in. (152.2 cm)
Max.
Alternate
Location
Darkwall
Panel
LOADING
END
DISCHARGE
END
Processor
35 in.
(88.9 cm)
Darkwall
Opening
Base Cabinet
Accessory
18-1/2 in.
(47 cm)

Figure 1-4, Wall Cut Out Dimensions, Side View

General Specifications

Materials

RP type medical X-Ray films and compatible chemicals designed for RP type processing.

Material Size

Minimum Size:	4" X 4" (10 X 10 cm)
Maximum Size:	14" X 36" (35.6 cm X 91.4 cm)
Base Thickness:	0.004-0.008"

Developing Time

Factory set at 20 seconds.
(36" per minute)

Developer System

Capacity: 3-3/4 gallons (14 l.).
Temperature Control: Adjustable, Ambient - 105 *f.* (41 C.)
Replenishment: Automatic, By film feeding.

Fixer System

Capacity: 3 3/4 gallons (14 l.)
Temperature Control: Ambient.
Replenishment: Automatic, by film feeding.

Wash System

Capacity: 4 gallons (16 l.)
Temperature controlled by incoming water supply, .5 GPM (1.9 LPM) during the process cycle and operation of the anti-crystallization cycle. There is no water flow in standby mode.

Use of the standard **Wash Water Recirculation Kit** eliminates the need for external plumbing.

Dryer System

Temp.: Adjustable, ambient to 140 degrees *f.* (60 C.)

Figure 1-5, General Specifications, Sheet 1 of 2

General Specifications, Continued

Electrical Requirements

120 VAC, 15 amps, 50/60 Hz.
220 VAC, 7.5 amps, 50/60 Hz.

Dimensions

Width: 23 5/8" (60.0 cm)
Height: 23 1/2" (59.1 cm)
Length: 46 1/2" (118.0 cm)

Weight

Approximate Operating Weight: 535 lbs. (243 kg)

Standard Accessories

- Water Inlet Hose
- Drain Hose
- Over-flow Drain Hose
- 220V Hospital Grade Plug
- Quick Disconnect, Water Inlet
- Plumbing Installation Kit
- Line Cord
- Replenishment Tanks (2) 11 gal capacity

Optional Accessories

Base Cabinet Accessory	(p/n 525-180-13)
Darkwall panel kit	(p/n 999-230-1203)
All Temp Water Filter	(p/n 58-199)
Daylight Film Loading Kit	(p/n 990-230-1702)
External Wash Water Recirculation Kit.	(p/n 999-230-1707)

Specifications are subject to change without prior notice.

Figure 1-5, General Specifications, Sheet 2 of 2

Section 2
Installation

AFP 14X-3
X-Ray Processor

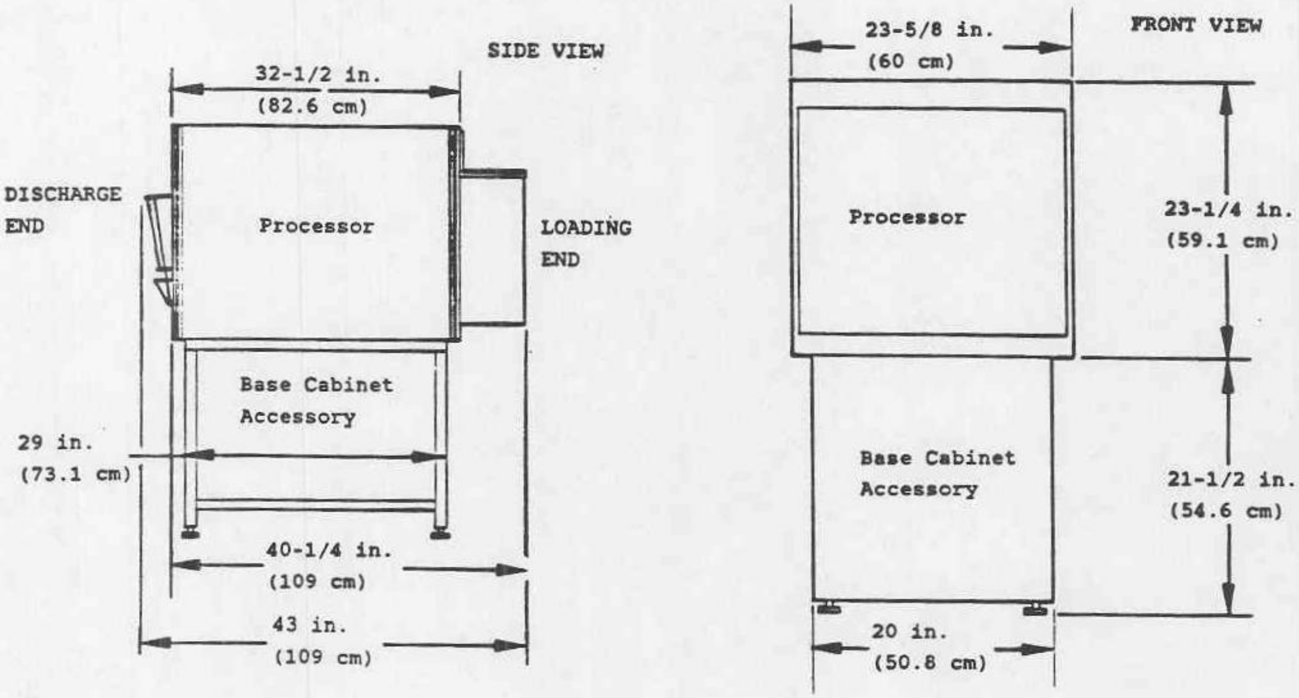

SIDE VIEW
32-1/2 in.
(82.6 cm)
DISCHARGE
END
Processor
LOADING
END
Base Cabinet
Accessory
29 in.
(73.1 cm)
40-1/4 in.
(109 cm)
43 in.
(109 cm)
23-5/8 in.
(60 cm)
FRONT VIEW
Processor
23-1/4 in.
(59.1 cm)
Base Cabinet
Accessory
21-1/2 in.
(54.6 cm)
20 in.
(50.8 cm)

Figure 2-1, AFP 14X-3 Processor Dimensions

Introduction

This section includes Pre-Installation Instructions and Installation Instructions for the *AFP 14X-3* Radiographic Film processor.

The installation procedure consists of the following steps:

1. Pre-Installation preparation.
2. Installing the processor in the darkroom.
3. Plumbing the processor
4. Making electrical connections.
5. Checking operation.
6. Setting solution and dryer temperature(s).
7. Replenishment calibration.
8. Final Set-Up and check out.

Pre-Installation

Before the scheduled installation date, plan and prepare the operating site as outlined. Following these steps will make the installation faster and less expensive.

Space

Provide sufficient space not only for the processor and its accessories, but also space to allow cleaning, preventive maintenance and servicing of the processor.

Figure 2-1 illustrates the general dimensions of the processor.

Location

The **AFP 14X-3** processor may be installed either entirely within a darkroom or, for ease of film delivery to a viewing area, through the darkroom wall. Figures 2-2, 2-3 & 2-4 illustrate options for a through-the-wall installation.

NOTE: A **Darkwall Panel Kit** (p/n 999-2301-203) is recommended to make a light tight seal around the processor if a through-the-wall installation is desired.

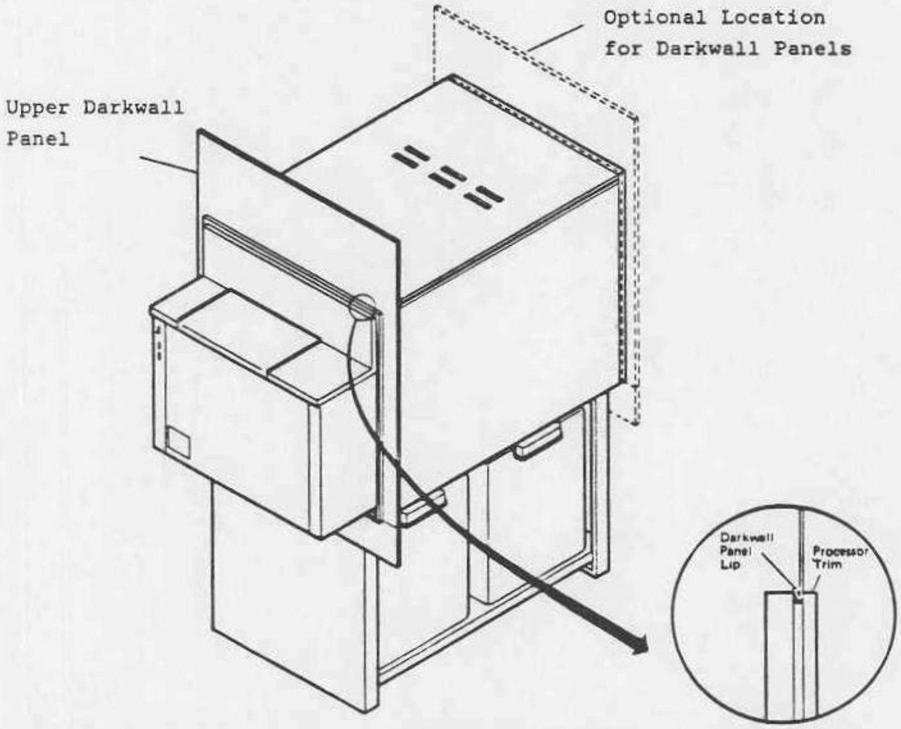


Figure 2-2, Processor with Darkwall Panels for through-the-wall installation.

Pre-Installation, Continued

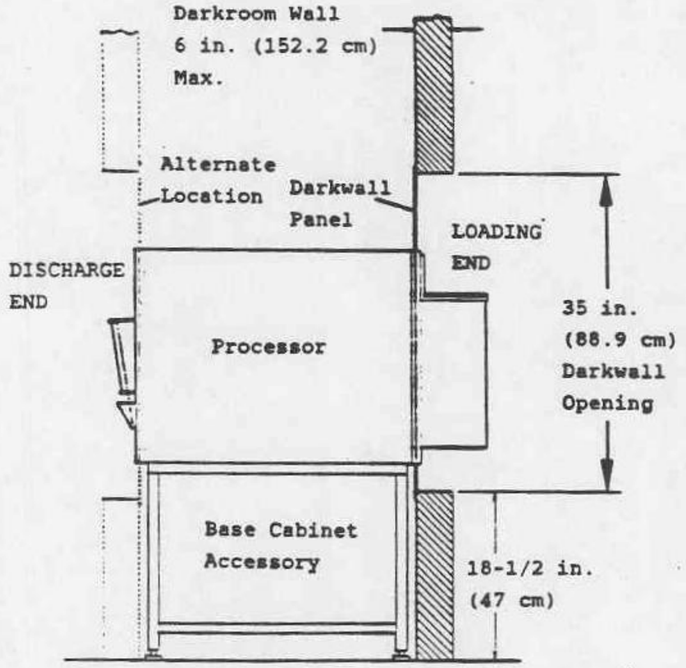

Darkroom Wall
6 in. (152.2 cm)
Max.
Alternate
Location
Darkwall
Panel
LOADING
END
DISCHARGE
END
Processor
35 in.
(88.9 cm)
Darkwall
Opening
Base Cabinet
Accessory
18-1/2 in.
(47 cm)

Figure 2-3, Through-the-wall Options

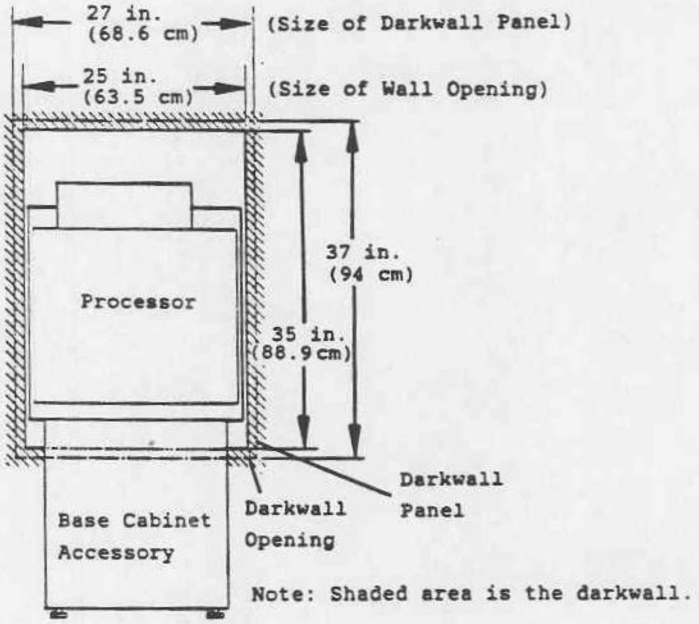

27 in.
(68.6 cm)
(Size of Darkwall Panel)
25 in.
(63.5 cm)
(Size of Wall Opening)
37 in.
(94 cm)
Processor
35 in.
(88.9 cm)
Darkwall
Panel
Base Cabinet
Accessory
Darkwall
Opening
Note: Shaded area is the darkwall.

Figure 2-4, Darkwall Panel Installation

Pre-Installation, Continued

If a through-the-wall installation is planned, all wall preparation should be completed before actual installation of the processor is started.

Power Requirements

The *AFP 14X-3* processor can be configured for either of the following power requirements:

115 VAC, 50/60 HZ, 15 amps, single phase.
220 VAC, 50/60 HZ, 7.5 amps, single phase.

The processor is equipped with an input transformer with taps for either input voltage. 50 hz operation will require a change of drive chain and sprocket.

Plumbing

Water Supply: The processor will require a tempered water supply between 65-90 degrees *f.* (18-32 C.), with an available flow rate of at least 2 gallons per minute.

Drain: A floor drain with a capacity of 3 gallons per minute must be available within 6 feet of the processor.

NOTE: The drain must not contain any copper piping as photographic chemicals will quickly cause damage.

All drain installations must be in compliance with all local and federal EPA requirements and guidelines. If you are unsure of current requirements please contact your nearest EPA office for additional information.

Wash Water Recirculation Kit

U.S. Air Force and U.S. Army versions of the *AFP 14X-3* processor are shipped with the External Wash Water Recirculation Kit, p/n 999-2301-702.

If this kit is used there is no requirement for external plumbing connections other than a water source to fill the 30 gallon water reservoir and a facility for draining the reservoir. See **Section 7, Accessories** for installation details.

Installation

The following tools will be needed to easily install the **AFP 14X-3** processor.

Carpenters Level
Wrench Set
5/64" Hex key wrench
Standard Screwdrivers
Metal Process Thermometer (Not Glass/Mercury type)

Unpacking

1. Before unpacking the processor, carefully inspect the exterior of the crate for shipping damage. If any are present, contact your shipper before proceeding.

2. Unband and remove the external packaging, leaving only the processor remaining on the skid.

3. Open all cartons containing loose parts, inspect for damage and inventory them against the packing list.

4. Examine the processor for any signs of damage. If any is found report it immediately to the shipper who delivered your processor.

5. **Do Not** remove the protective covering from the feed tray until the processor is installed.

6. Move the processor, on its skid if possible, to the final installation site.

Position Processor

The processor must be installed on a sturdy stand capable of supporting its' operating weight of 535 lbs. (243 kg) pounds. The optional **Base Cabinet Accessory** (p/n 525-18013) is recommended for this purpose.

If you are using the optional Base Cabinet Accessory refer to instructions packed with that unit and assemble it as instructed.

1. Position the stand or table for the processor where it will be located when the processor is operating. Use a carpenters level to level the stand in both directions.

Position Processor, Continued

If the support stand you are using is not equipped with leveling feet use shim stock or other appropriate material to level the stand.

NOTE: Do Not attempt to mount the processor on the stand or base until instructed to do so.

2. Using a screwdriver, release the top center cover latch on the processor. Lift the top panel off of the processor and set aside.

3. Carefully lift off the two side panels and set aside.

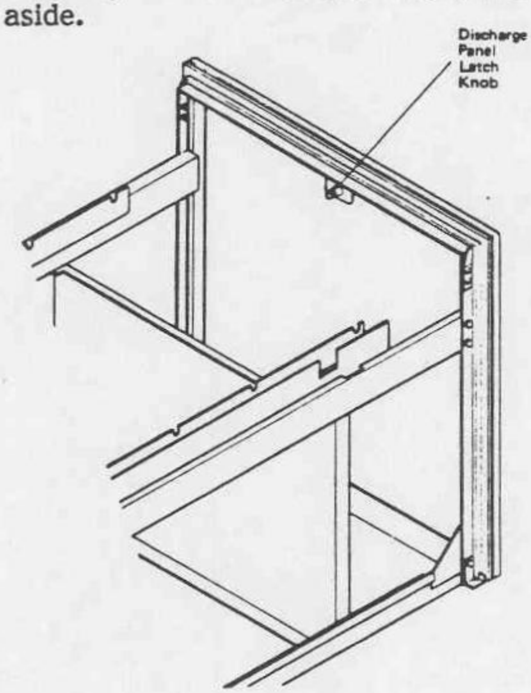


Figure 2-5, Rear Panel Latch Knob

4. Remove the rear panel. The latching knob must be pushed in and turned to release. Set the panel aside. See Figure 2-5.

5. Using at least two people, lift the processor from the skid ands place it on its table or stand positioned and leveled previously.

   Note: You may want to first reduce the weight of the processor by first removing the cross-overs, processing racks and dryer section and setting them to one side.

Level Processor

1. Verify that the processor is level by placing a carpenters level along the side rails and front and rear trim pieces. See Figure 2-6. Adjust the processor or base as required to level the processor if necessary.

   NOTE: The final leveling of the processor is an important step that is critical for proper and reliable operation of the processor. If the processor is operated without being properly leveled problems could be encountered.

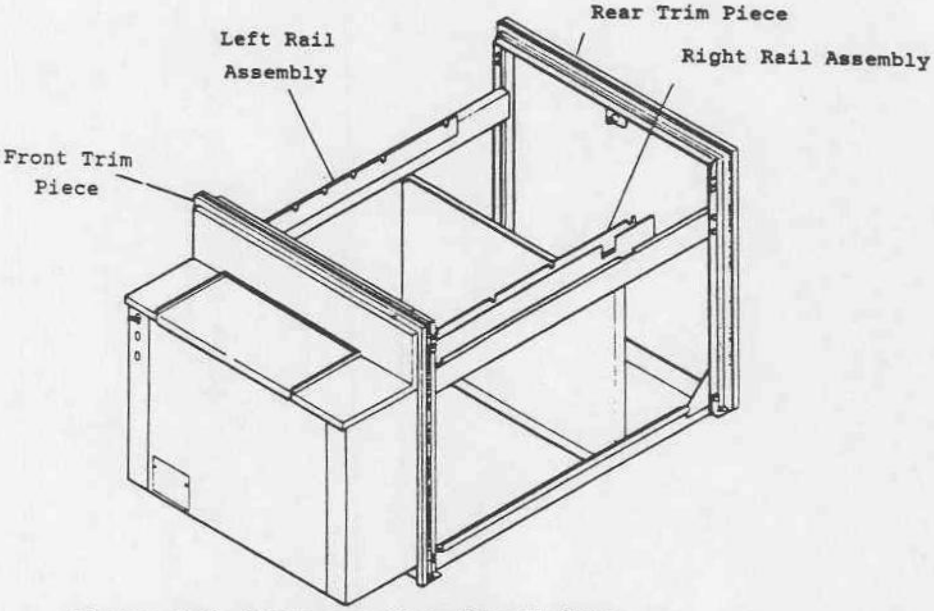


Figure 2-6, Processor Leveling Points

Connect Water Supply

1. Route a high pressure (washing machine type) hose from the water supply to the water inlet on the front of the processor. See Figure 2-7. A water flow rate of 3/4 GPM (2.8 LPM) is required.

2. Use teflon tape on all connections to assure a leak proof installation.

   NOTE: If the water supply line to the processor contains a high content of iron, rust or other minerals, the installation of an AFP All-Temp Water Filter Kit (p/n 58-199) may be required to obtain satisfactory processing quality.

Connect Drain(s)

CAUTION: Verify that the drain system does not contain any copper pipes. Photographic chemicals will quickly destroy copper plumbing.

NOTE: It is the responsibility of the owner of this processor to verify that all drain connections are in compliance with plumbing codes and local and Federal EPA guidelines and regulations in effect at time of installation.

1. Use plastic pipe and fittings to connect the drain manifold outlet on the front of the processor to a floor drain capable of handling 3-4 GPM of effluent.

   Drain flow from the processor must be a continual downward direction. Low spots or kinks that can trap drainage may lead to overflow of chemistry in the processor.

2. Use Teflon tape and sealer to assure that all joints are liquid tight.

3. Connect a length of 1/2" clear tubing to the drip pan outlet on the processor and route the other end to the floor drain.

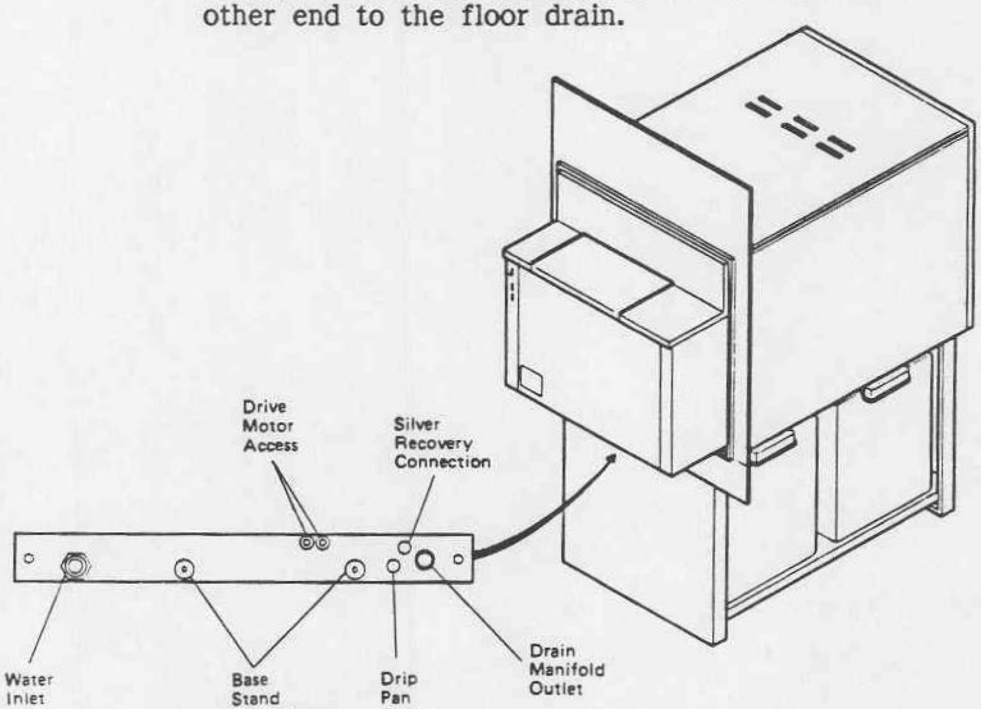

Drive Motor Access
Silver Recovery Connection
Water Inlet
Base Stand Mounting
Drip Pan Outlet
Drain Manifold Outlet

Figure 2-7, Plumbing Connections

Connect Silver Recovery Unit (Optional)

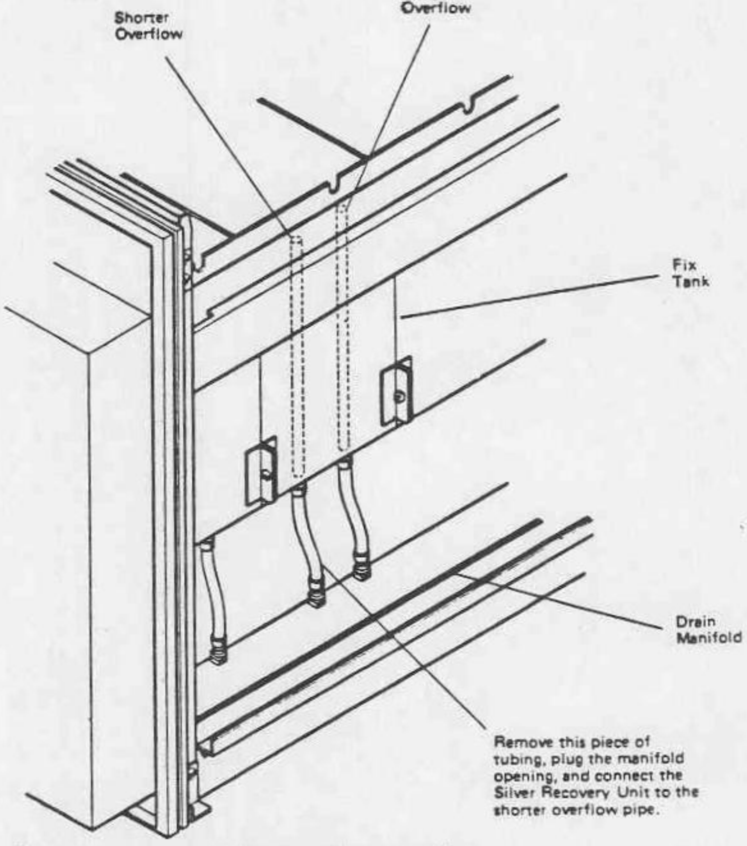
If a silver recovery unit is being used with the processor it should be connected in the following manner:

1. Remove the tubing connecting the shorter of the two overflow tubes in the fix tank to the drain manifold. See Figure 2-8.

2. Install a plug in the drain manifold where the above tubing was removed.

3. Using 3/8" (1 cm) I.D. tubing, route the output of the short overflow tube, through the hole in the front drain panel, See Figure 2-7, to the silver recovery unit and thence into the drain.

   Caution: As above, be certain that there are no kinks or low spots in the lines leading to the silver recovery unit. In the event of an obstruction in this line the fix tank will overflow directly into the main drain via the longer standpipe.



Remove this piece of tubing, plug the manifold opening, and connect the Silver Recovery Unit to the shorter overflow pipe.

Figure 2-8, Silver Recovery Connections

Install Replenishment Tanks

The replenishment tanks are usually positioned under the processor. If you are unable to position them under the processor they must be placed within 6 feet of the processor.

1. Unpack and assemble the two replenisher tanks.

2. Connect one end of the supplied RED replenisher tubing to the tubing and fitting connected to the **developer** replenisher pump. See Figure 2-9.

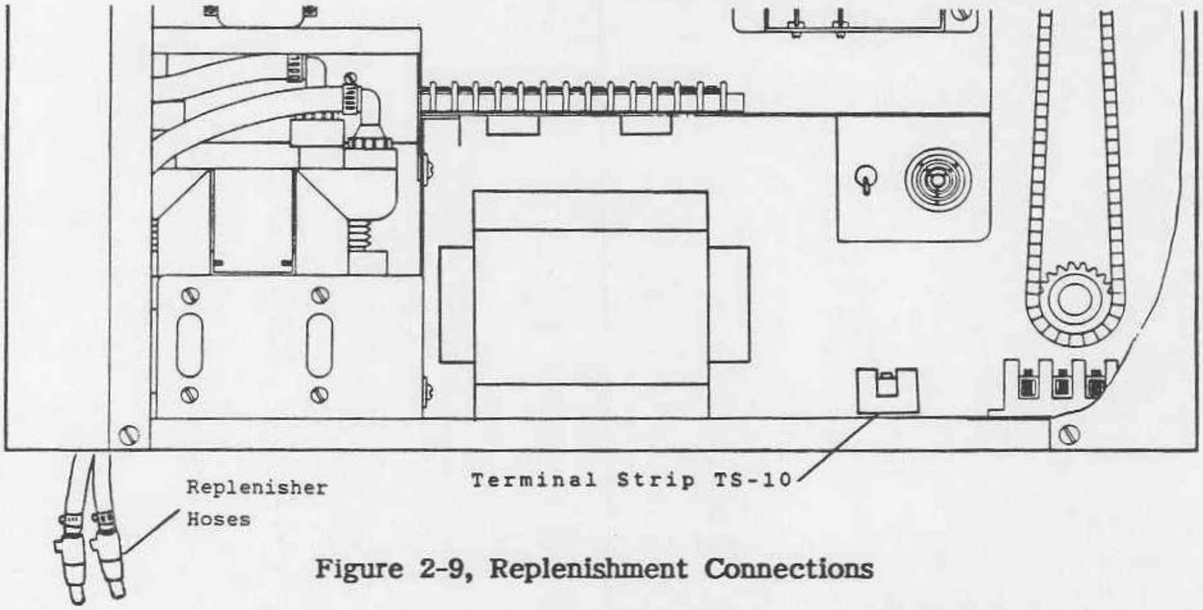


Figure 2-9, Replenishment Connections

3. Connect one end of the supplied BLUE replenisher tubing to the tubing and fitting connected to the **fixer** replenisher pump. See Figure 2-9.

4. Route the remaining end(s) of the replenisher tubing to the respective developer or fixer replenishment supply container.

   NOTE: If the Darkwall Panel Kit was used for a through-the-wall installation, holes and light sealing gaskets are provided to allow passing the replenishment hoses through the panel

5. Verify that all clamps are secure.

6. Using a utility hose, place about 2 gallons of warm water in each of the replenishment supply tanks.

Connect Power

WARNING: These steps may involve handling potentially fatal voltages. All electrical connections must be made by a qualified electrician and comply with local electrical codes. This processor must not be run without a known secure ground.

115 VAC Power

The electrical receptacle (outlet) configuration for 115 volt installation is shown in Figure 2-10. Have electrical power, with this outlet installed, within 6" of where the lower right front corner of the processor is to be positioned.

Before connecting to 115 VAC, verify that the power tap (White Wire) is attached to terminal #2 on Terminal Strip TS-10, located in the control enclosure, near the input transformer the input transformer, see Figure 2-9.

Units are shipped with a 115 VAC plug of the configuration shown in Figure 2-10. Connect this plug to a service of 20 amps or greater capacity using a matching receptacle.

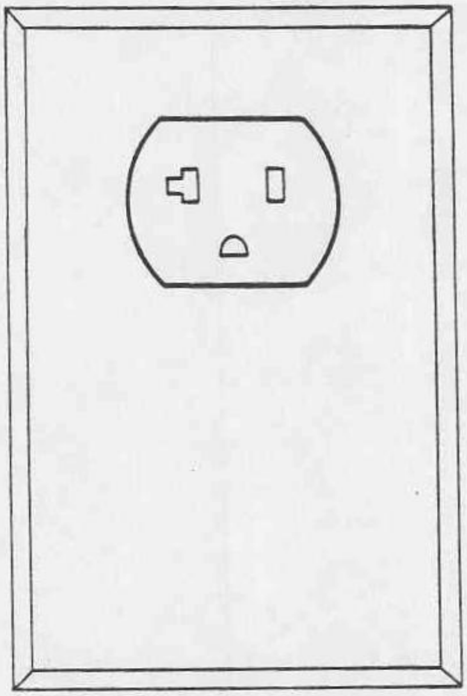


Figure 2-10, 115 VAC Plug Configuration

220 VAC Power

For connection to 220 VAC service, two electrical changes must be made:

1. Move the power tap (White Wire) from terminal #2 to terminal #3 on terminal strip TS-10 in the control enclosure, see Figure 2-9.
2. Change the power cable plug to the hospital grade, 220 VAC plug, included with the processor.

50 Hz Operation

If a change from 60 hz to 50 hz operation is required, perform the following steps:

1. Locate the spare drive chain and sprocket stored in circular boxes near the replenisher pumps in the control chassis area.
2. Loosen the tension spool and remove the existing drive chain and **14 tooth motor drive sprocket** from the processor. (See Figure 2-11)
3. Install the new **17 tooth** drive sprocket on the drive motor and install the **longer** of the two drive chains. Tighten the chain with the tension spool. Store the removed parts for future use.

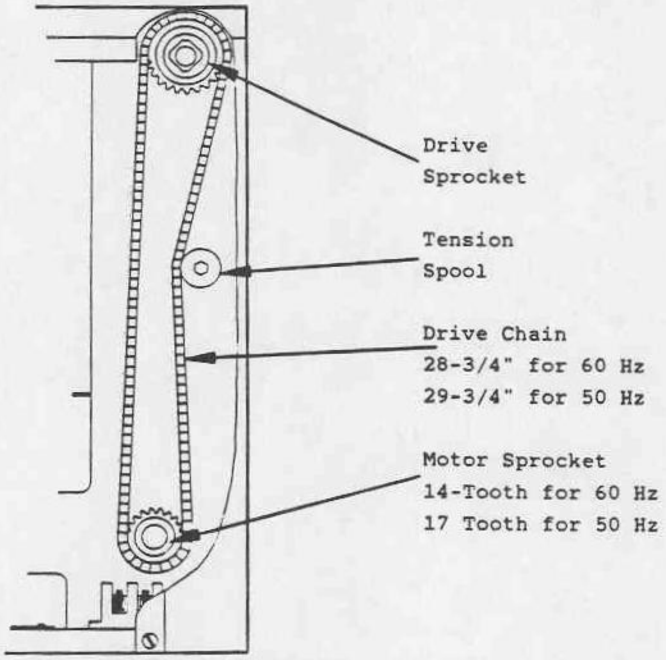

Drive
Sprocket
Tension
Spool
Drive Chain
28-3/4" for 60 Hz
29-3/4" for 50 Hz
Motor Sprocket
14-Tooth for 60 Hz
17 Tooth for 50 Hz

Figure 2-11, Drive Chain & Sprockets

Adjust Squeegee Rollers

The wash rack is equipped with adjustable squeegee rollers. Inspect and adjust as follows:

A. Remove the rack from the processor and locate the adjusting screw, See Figure 2-12.

B. Insert a piece of film between the squeegee rollers and, using a 5/64" hex key, turn the adjusting screw as necessary until the film just "drags" on the rollers. Check the adjustment at both ends of the rack

C. Replace the rack in its tank.

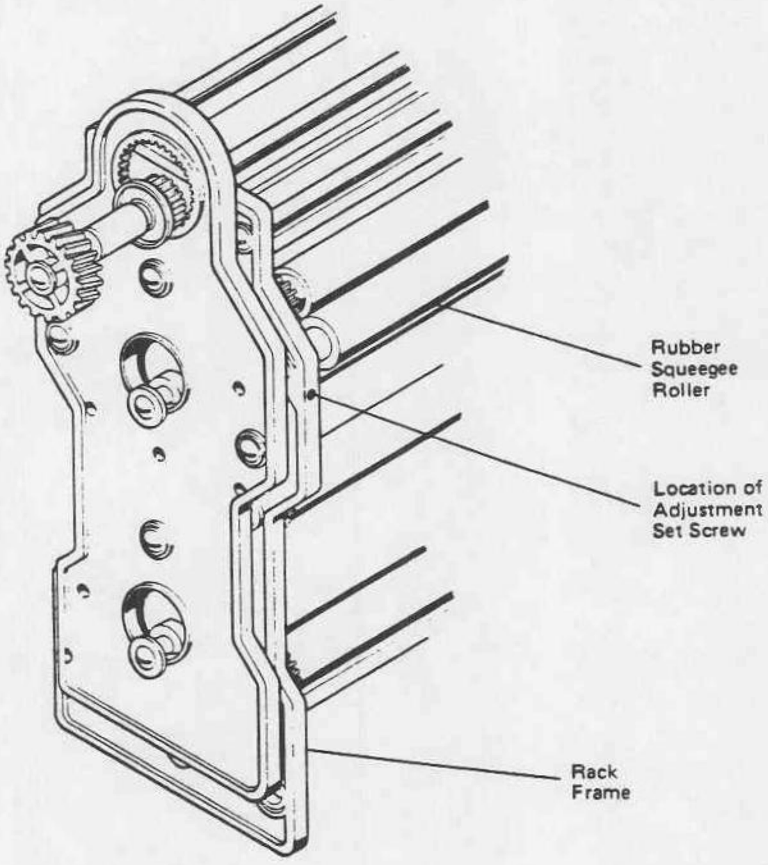

Rubber Squeegee Roller
Location of Adjustment Set Screw
Rack Frame

Figure 2-12, Squeegee Roller Adjustment

Processor Check-Out

Caution: To prevent damage to the processor all "wet" processing tanks (Developer, Fix & Wash), must be filled with water before the processor is turned ON.

1. Check and tighten all hose clamps on the processor and drain lines.

2. Remove each processing rack and inspect its tank for packing material or debris, clean as necessary and replace the rack.

3. Close all drain valves and, using a utility hose, carefully fill each of the "wet" tanks to its overflow with water. Check for leaks and correct as necessary.

4. Turn the power switch ON. The following will occur:

   A. The drive system will operate.

   B. The wash water solenoid will open and water will flow into the wash tank

   C. The circulation pumps will run circulating the water in the developer and fix tanks.

   D. If the low level sensors in the developer tank are covered, the developer heating circuit will switch on and start heating the contents of the tank. If the low level sensor is not covered the replenishment pumps will turn ON and attempt to correct the low level condition.

      NOTE: In some areas, plain tap water may not conduct sufficiently to activate the level sensors in the developer tank, resulting the processor locking into a low level condition.

      If this is the case, adding a small amount of developer to the water will usually correct the situation.

Processor Check-Out, Continued

5) Return the power switch to OFF. Set the Developer temperature and Dryer temperature control to the desired values. See Figure 2-13.

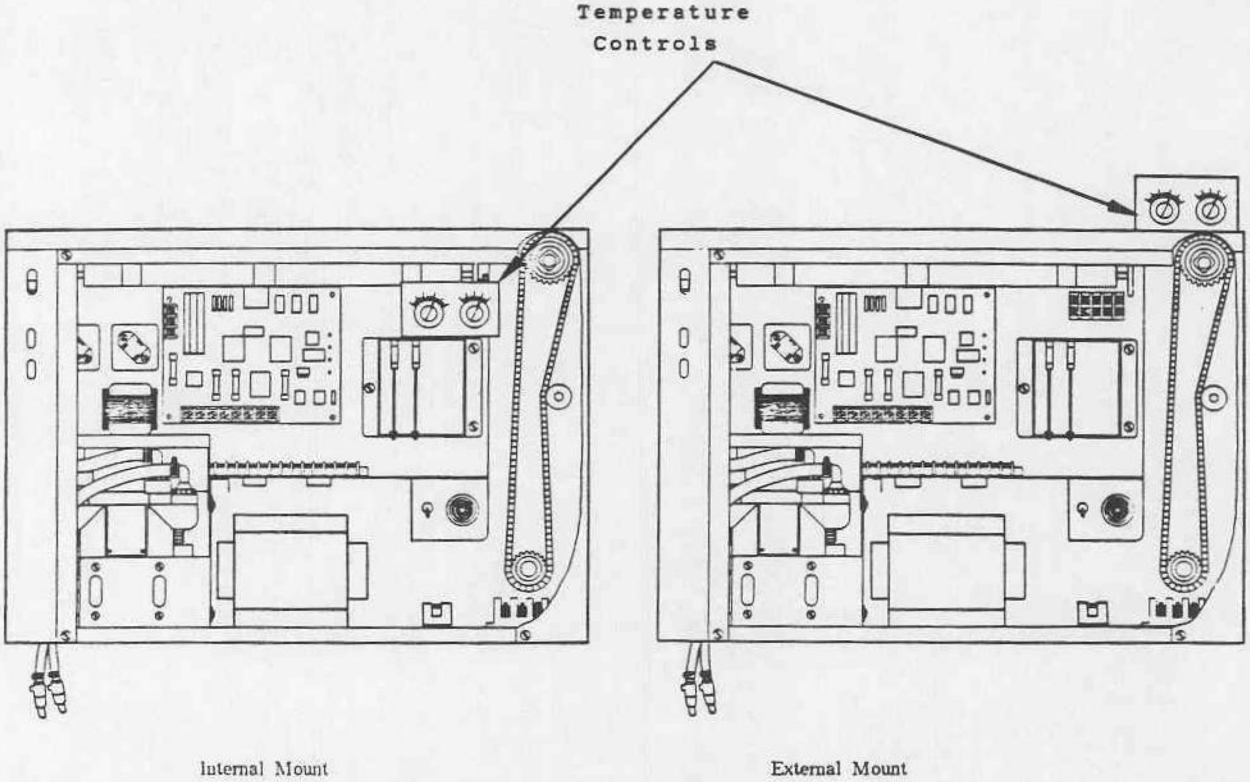


Figure 2-13, Developer & Dryer Temperature Controls

6) Switch the processor ON again and allow it to warm up for approximately 15 minutes. Continually inspect the processor for leaks.

During warm-up inspect that the following takes place:

A) The drive and wash system should run for about 4 1/2 minutes after power is applied and then return to standby mode.

B) Every 3 minutes there after the drive system should turn on, or "jog" for approximately 10 seconds to prevent crystallization of chemicals on the air exposed portions of the rollers.

Processor Check-Out, Continued

7. Using a metallic thermometer monitor the developer temperature. Adjust the temperature control as required until the desired temperature is reached.

   Caution: Never use a glass thermometer in the processor. Should it break, the resultant mercury debris may permanently contaminate that part of the processor.

8. Activate the film feed switch. The processor should change to process mode and continue to operate for approximately 4 1/2 minutes, and then return to standby.

9. Feed several pieces of previously exposed and processed film through the processor.

   Carefully examine the transport system and verify that the film is transporting smoothly and that each rack is turning without binding. Correct any problems that are observed.

   Check for the following:

   A. Approximately 3 seconds after the film has cleared the filmfeed switch an audible "Beep" should sound indicating that the next piece of film may be fed.

   B. Approximately 2 minutes after the "Beep" is heard the film should drop into the receiving bin.

   C. Inspect the film for scratches, determine the cause as follows and correct:

      1. Remove the splash guard and crossovers.

      2. Feed in a fresh piece of processed film, inspect for scratches as it leaves the developer tank.

      3. If none are found insert the film into the fix rack, the wash rack and then the dryer, inspecting after each rack until the location of the scratching is located. Correct as necessary.

Check Replenishment

Although each type of film and chemistry will have slightly different replenishment requirements, the following will provide a "Starting Point" suitable for most applications.

1. Verify that the detector fingers, see Figure 2-14, actuate the replenishment switches when a piece of film is fed into the processor.
2. Lift the replenisher delivery hooks out of each tank and hang each into a graduated container.
3. Trip one feed detector finger and run the pumps until all of the air has been pumped out of the lines. Empty each of the graduated containers.
4. Trip both of the feed switches, this time for exactly 60 seconds. The graduated containers should have approximately the following amounts in them at the end of the test:

   Developer: 120 ml **Fixer: 110 ml**

   If this is not the case refer to Section 5, Service, for instructions on calibration of the replenishment pump(s) and correct as necessary.

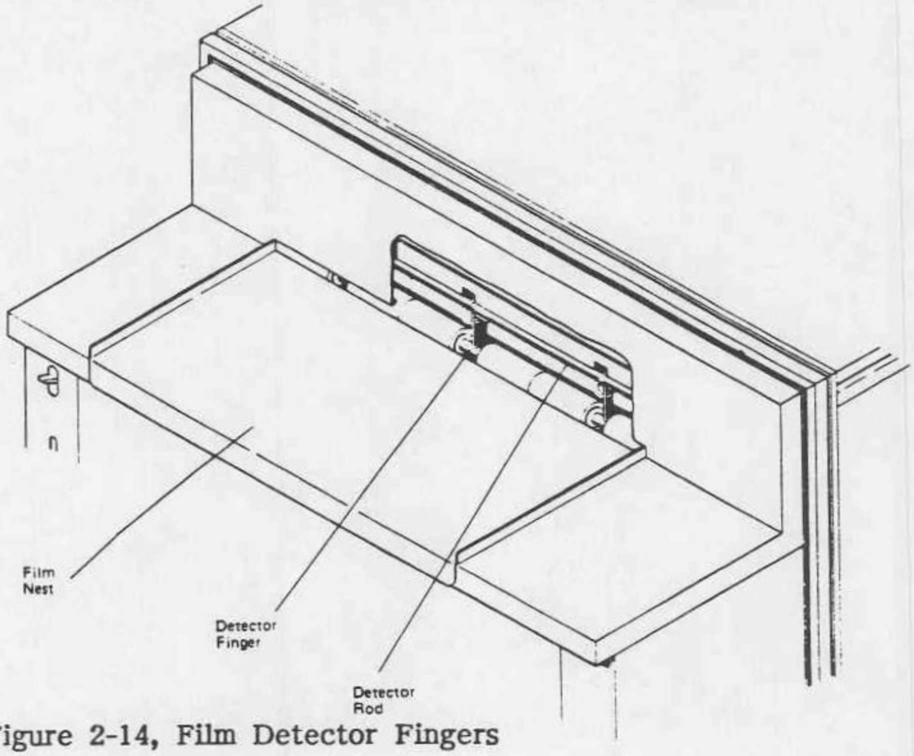


Figure 2-14, Film Detector Fingers

Select Replenishment Mode

The **AFP-14X-3** processor is equipped with two modes of replenishment, they are:

1. **"Standard" Replenishment Mode**

   In this mode replenishment occurs dependent on the amount of film processed. Each time film is fed into the processor replenishment is made. There is no replenishment in the "Stand By" or "Jog" mode.

   The processor is set to operate in this mode at the factory and is for use in installations with an average amount of film being fed each day.

2. **"Flooded" Mode**

   "Flooded" mode replenishes in the same manner as the standard mode and, in addition, replenishes during "Jog" operation.

   This method of replenishment is recommended for low volume applications where the replenishment provided via the film being fed is insufficient.

The mode of replenishment is easily changed with Replenishment Switch S-1, located on the J-2 Timing Board. Up position is for "Normal" replenishment, down is for "Flooded" replenishment. See Figure 2-15.

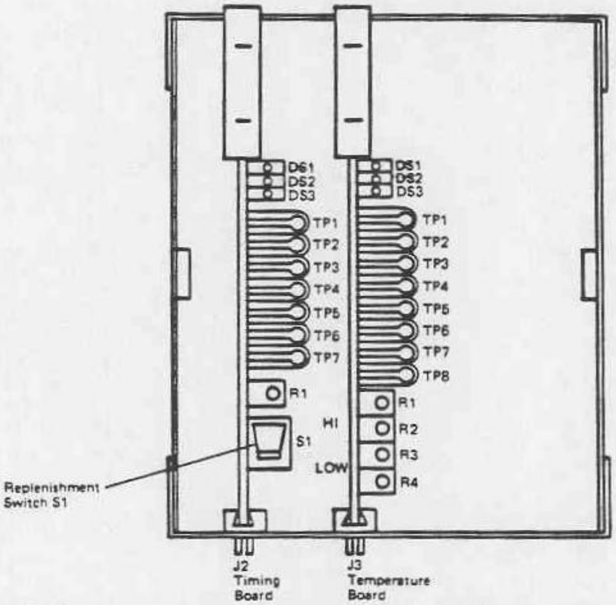

DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
R1
HI
S1
LOW
Replenishment Switch S1
J2 Timing Board
DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
R1
R2
R3
R4
J3 Temperature Board

Figure 2-15, Replenishment Select Switch

Final Check-Out

1. Thoroughly inspect the entire processor for any indication of leakage, correct as necessary.
2. Turn the processor OFF and drain all of the tanks. Thoroughly rinse out each tank and rack assembly.
3. Empty and rinse out the replenisher tanks.
4. Peel the protective plastic coating off of the film feed area.

Install Daylight Loading Hood

U.S. Air Force versions of the ***AFP 14X-3*** processor are shipped with a daylight loading hood accessory designed to allow operation of the processor without a darkroom facility.

Refer to **Section 7, Accessories,** for instructions for installing the daylight loading hood kit.

Complete Installation

If the processor is installed through-the-wall, position the wall masking panels.

Turn off the lights in the darkroom and inspect around the installation for light leakage. Correct as necessary.

If the processor is to be charged with chemistry, proceed to Section 3, Operation, and follow the instructions provided.

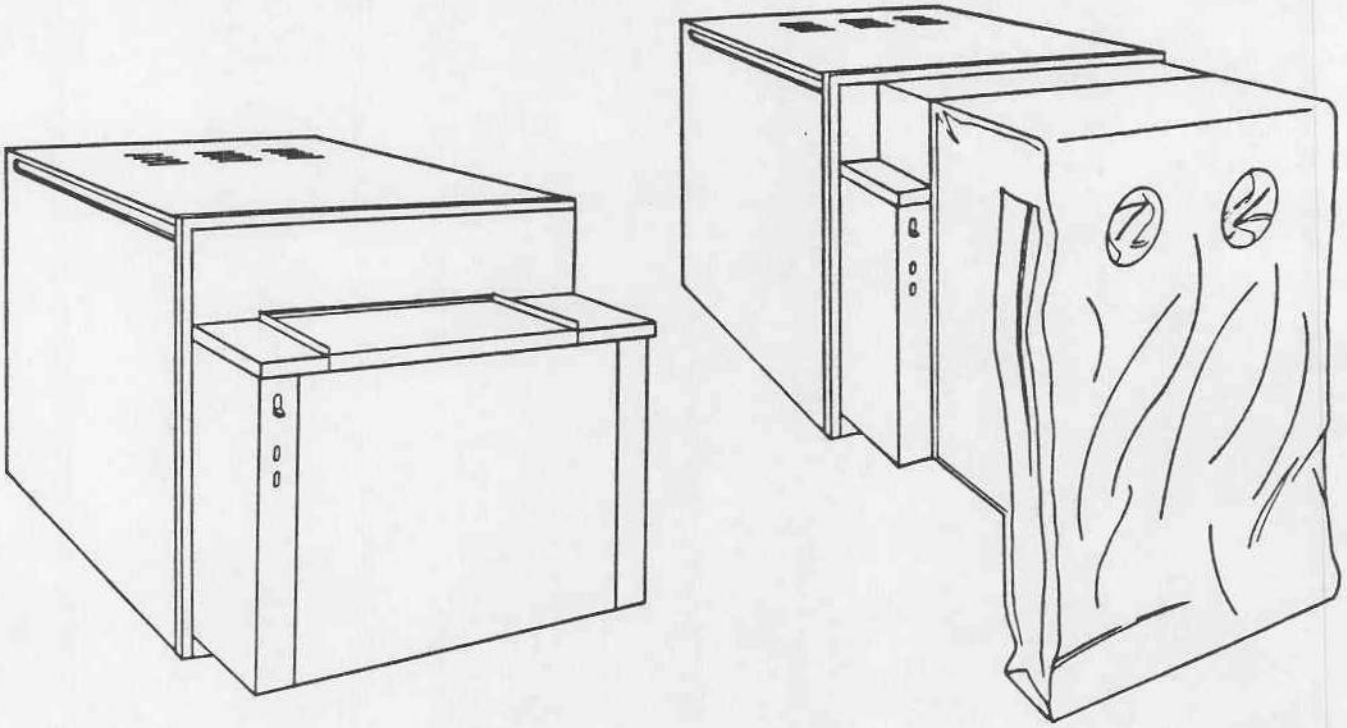
If the processor is not to be charged with chemistry immediately, replace all parts and panels removed during installation.

Notes:

Section 3

Operation

AFP 14X-3
X-Ray Processor



Film Tray Version

Daylight Loading Version

Figure 3-1, AFP 14X-3 Processor

Capability

The *AFP 14X-3* processor will develop, fix, wash & dry medical RP type X-Ray films in size from 4 X 4 in. (10 X 10 cm) to 14 X 36 in. (35.5 X 91.4 cm). The processor is designed to process RP type films using chemistries compatible with the film(s) being used.

References

All references as to direction (right, left, front and rear) are from the operators point of view. The control panel is considered the "Front" of the processor, the receiving bin the "Rear".

Consumable Product Specifications

Consult with the sensitized products manufacturer regarding quality control procedures, chemical mixing procedures, solution temperatures, developing time, replenishment rates and film handling procedures.

General Description

NOTE: Familiarize yourself with the content of this section before attempting to operate this processor.

The ***AFP 14X-3*** Processor is illustrated in Figure 3-1.

Exposed film is fed into the processor at the film feed tray at the front of the processor. As film trips the film feed detectors the processor automatically changes from stand-by to process mode. When this happens the transport (drive) system starts, the dryer begins to heat and wash water flow is initiated.

The film is moved through the developer, fixer, wash and dryer sections by an all roller transport system. The processed and dried film is deposited into the receiving bin at the rear of the processor.

Panel Removal

NOTE: The top cover must be removed before the side panels can be removed.

Top Cover: Press down on the front center top cover latch with a screw driver, see Figure 3-2. With the latch released, lift up on the top cover until the rear hooks release and the cover can be removed.

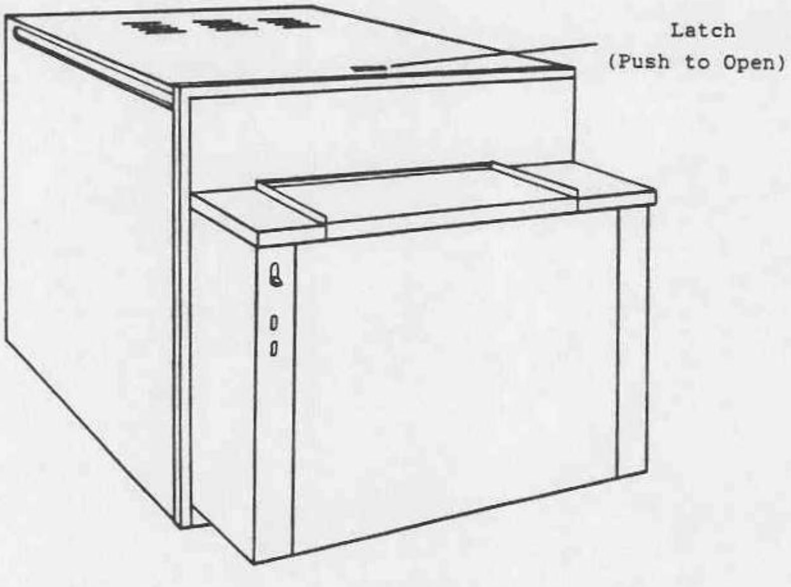


Figure 3-2, Top Cover Latch Location

Panel Removal, Continued

Side Panel(s): After removing the top cover, the side panels can be lifted off of the processor. When installing the side panels be sure that the panels are hooked in place at both top and bottom before replacing the top cover.

Rear Panel: The rear panel is held in place by a latch accessible from the inside of the processor. After removing the top cover, locate the rear panel latch, See Figure 3-3, press in and turn it 1/4 turn to release the rear panel.

Front Panel: WARNING: **The front panel covers the high voltage control section. Hazardous, potentially fatal voltages are present. This cover should be removed only by a qualified technician.**

To remove the front panel, loosen the two screws at the bottom of the panel, lift the panel slightly up, then away from the processor.

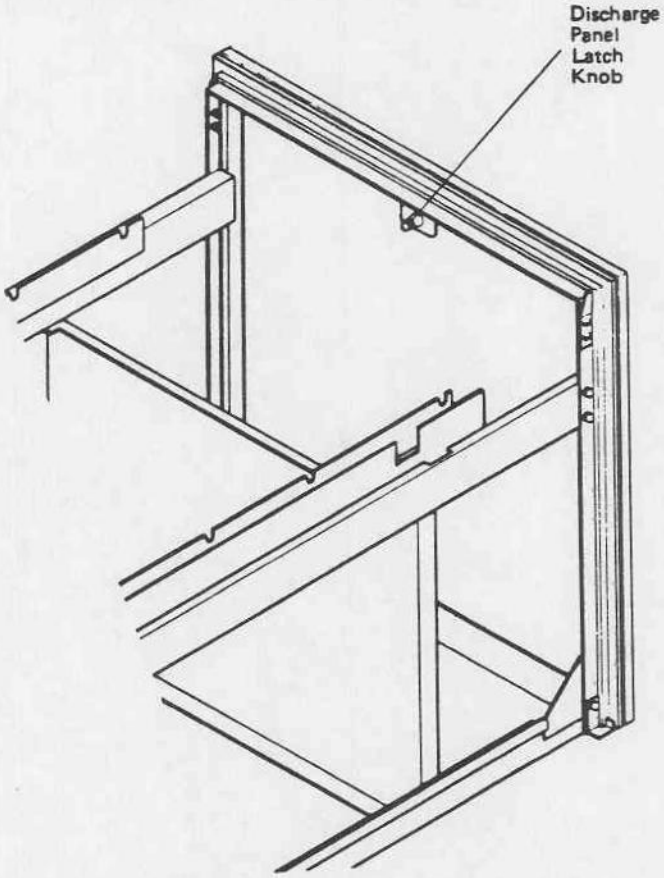


Figure 3-3, Rear Cover Latch

Processing Systems

The *AFP 14X-3* contains four systems to control processing variables such as processing time, solution temperatures, chemical circulation & agitation and the replenishing of chemical processing strength.

The transport system moves the material being processed through the processor at a constant speed, the tempering system controls the temperature of the developer & dryer, the circulation system provides for consistent circulation and agitation of the processing chemicals and the replenishment system maintains processing chemical strength.

A basic understanding will help you obtain the best results from your processor.

Film Transport System

A continuous roller transport system is used to transport the material being processed, from the feed tray to the receiving bin. Film is fed into the film feed slot until it trips the film feed detector fingers, see Figure 3-4. This starts the drive motor which, in turn, drives the rollers and advances the film through the processor. At the same time the wash water and replenishment systems are also activated.

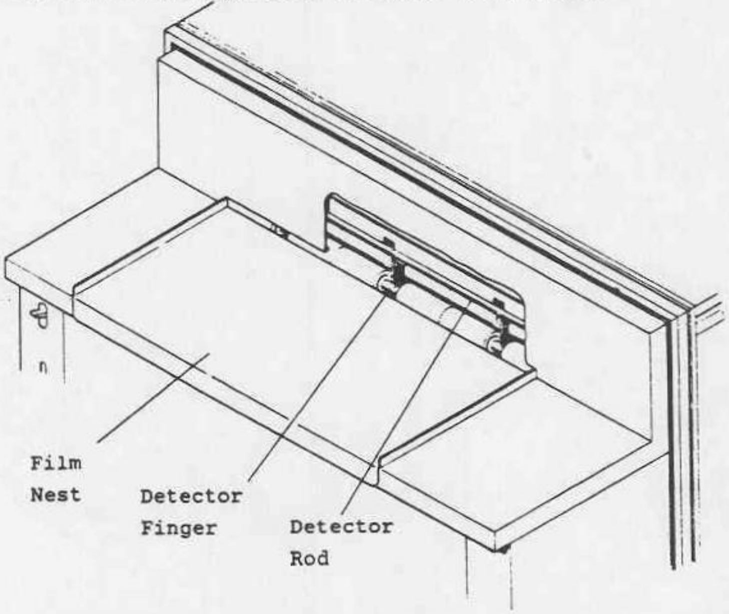


Figure 3-4, Film Feed Detector Fingers

Film Transport System, Continued

The transport system operates at a constant speed and turns off automatically shortly after the last piece of film being processed leaves the dryer. To prevent crystallization of chemicals on the air exposed rollers, the transport system runs, or "jogs" for 30 seconds every 8 minutes when film is not being processed, washing all of the roller surfaces with fresh chemistry.

Circulation & Agitation

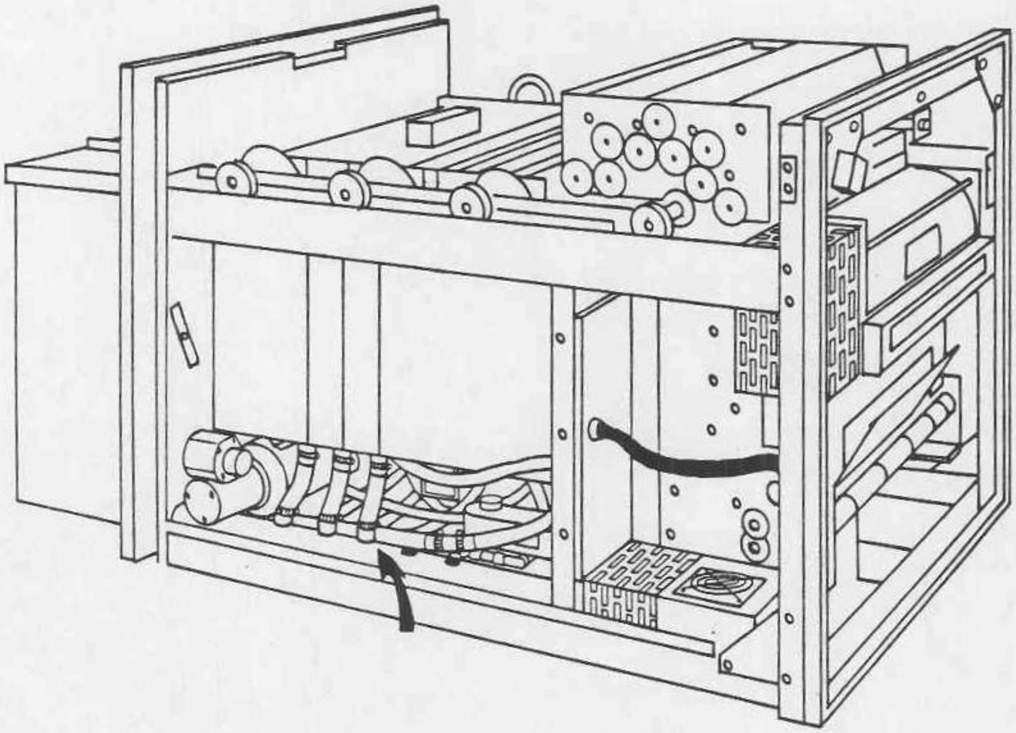


Figure 3-5, Drain Manifold

Separate pumps circulate developer and fixer in each of the respective solution tanks. The pumps operate at all times when the *POWER* switch is ON, even though the processor may be in stand-by mode. Pump circulation combines with the action of the rollers in the transport system to provide the appropriate amount of agitation needed to produce high quality radiographs.

Circulation & Agitation, Continued

Wash water, controlled by a solenoid, enters the wash tank constantly at a rate of 3/4 GPM (2.8 LPM) during the processing cycle.

A level detector system in the developer tank senses when there is a low level in that tank. When a low level occurs the replenishment system will automatically fill the tank to its operating level

Standpipes in the developer and fixer tank control the maximum level within each tank, allowing excess chemicals to flow out of the processor into the drains, see figure 3-5. In the event of a clogged fixer standpipe an additional "Safety" standpipe will provide drainage for fixer overflow.

The wash tank is equipped with an overflow weir at the rear of the tank to allow the skimming of overflow byproducts off of the top surface of the wash water. This overflow is drained via the developer cooling tube. Should this tube become clogged, a secondary wash overflow is provided to drain the weir directly into the drains.

When the *POWER* switch is turned OFF the wash drain solenoid is de-energized and the wash tank is automatically drained. This is done to reduce the growth of bacterial slime in the wash tank during shutdown.

Solution Heating & Tempering

The developer is heated by a 1500 watt heater located on the left side of the processor, see Figure 3-6. A temperature probe in the developer tank senses actual temperature within 0.5 degrees *f.* (0.3 C.) of the temperature set on the temperature control, located either to the right of the feed tray or inside the power section, see Figure 3-10.

Should the surface temperature of the heating element become excessively hot (above approximately 130 degrees *f.* (55 C.), as would happen if the processor were run dry, a safety thermostat in the element will open, stopping all heating. As the element cools the safety thermostat will re-set automatically.

Solution Heating & Tempering Continued

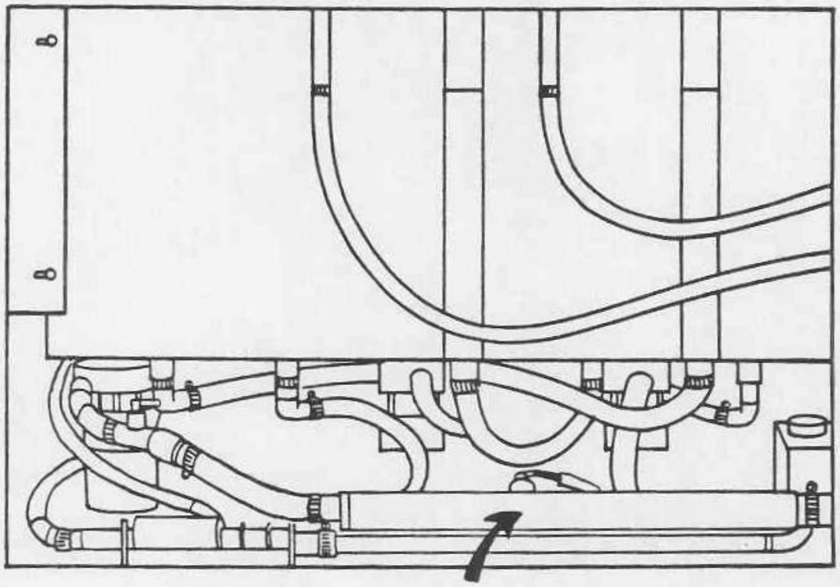


Figure 3-6, Developer Heater

The dryer system heats and circulates the drying air around the material being processed as it passes through the dryer. The "Lift out" and the "Front" dryer sections combine to dry the film being processed.

The temperature in these two dryer sections is set on a dryer temperature control, located either to the right of the feed tray or inside the power section, see Figure 3-10.

Overheat protection is provided in each of the heater sections by a re-settable over temp. device that, once tripped, must be manually reset by pushing on its reset button. See Figures 3-7 and 3-8.

To conserve energy the dryer is operated at a lower temperature during stand-by mode.

A vent fan, to prevent condensation of chemical fumes within the processor is located at the base of the dryer and is activated whenever the *MAINS* switch is on.

Solution Heating & Tempering Continued

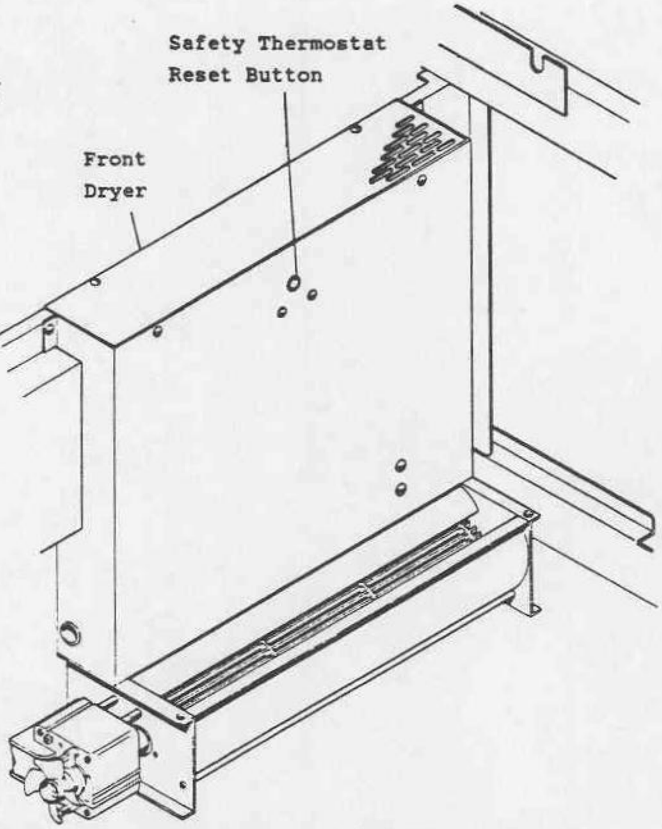

Safety Thermostat
Reset Button
Front
Dryer

Figure 3-7, Front Dryer Safety Switch

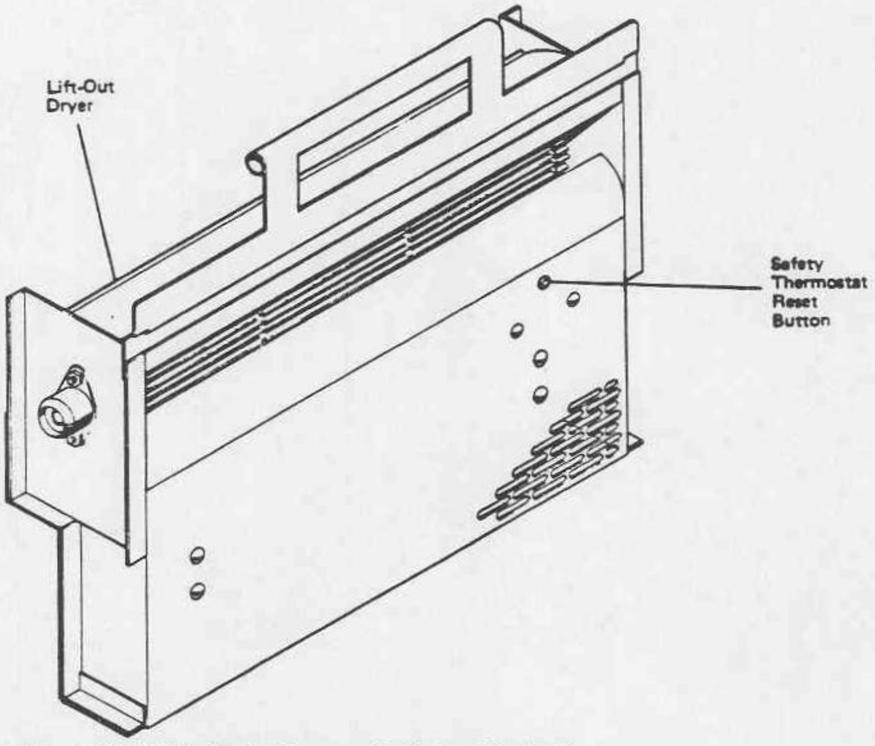

Lift-Out
Dryer
Safety
Thermostat
Reset
Button

Figure 3-8, Lift-Out Dryer Safety Switch

Replenishment System

The replenishment system is designed to replenish chemical strength that is reduced due to the processing of film. It is activated whenever the film feed fingers are tripped. The replenishment pumps, see Figure 3-10, run continuously when the film feed fingers are tripped. Actual output of the pumps is adjustable and should be calibrated for your particular application. See Section 5, Service, for calibration procedures.

In the event that very little film is processed each day the replenishment system can also be set to operate each time the "jog" function operates. See Section 5, Service, for additional information.

An overall schematic of the circulation system is shown in Figure 3-9.

Drains

The developer and fix tanks may be drained by opening a drain valve located on the right side of the processor,directly below each tank.

The wash tank is equipped with a solenoid that automatically drains the tank when the processor *POWER SWITCH* is turned OFF.

Figure 3-9, Circulation System

Controls & Indicators

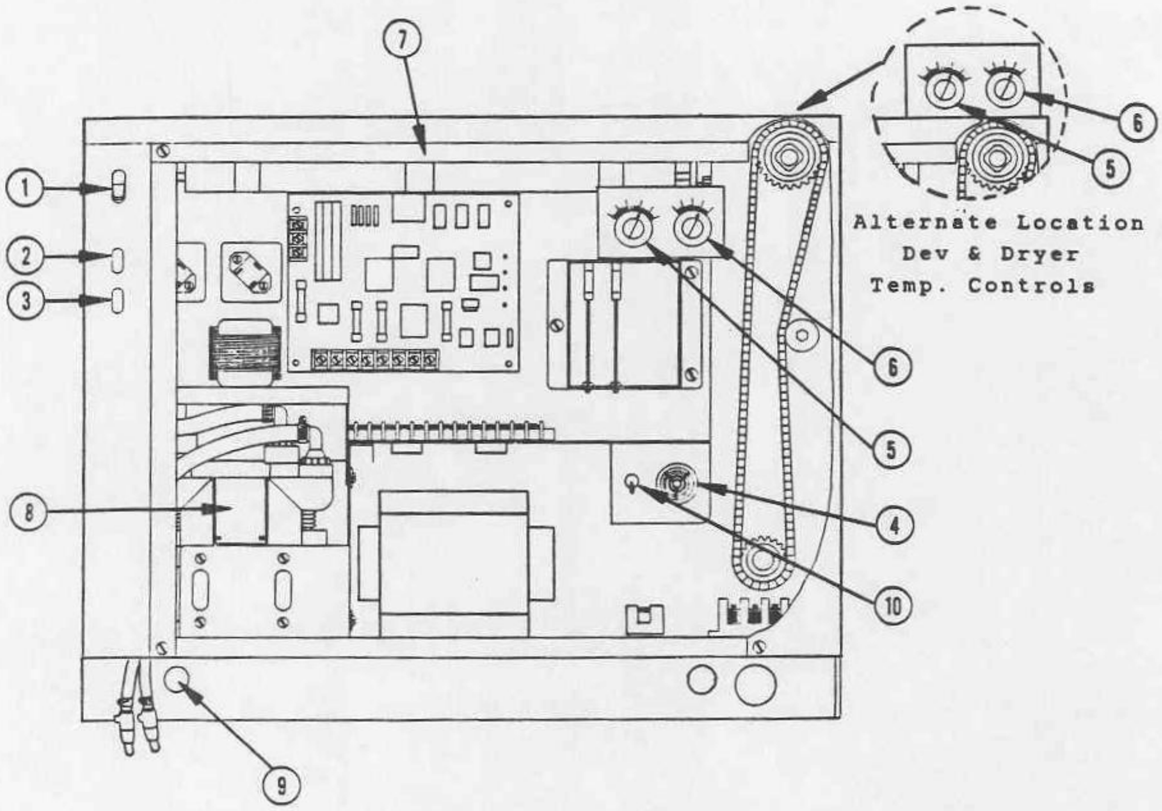


Figure 3-10, Controls & Indicators

Unless otherwise indicated, the following controls and indicators are shown on Figure 3-10.

1. POWER Switch

This is the main OFF/ON control for the processor. When ON the *MAINS* indicator light will also be ON.

2. MAINS Lamp

This lamp will be lit whenever the processor is connected to power, even if the ***Power Switch*** is **OFF.**

3. TEMP/FEED Indicator

The ***Temp/Feed*** indicator lamp has three functions:
1. During warm-up the light will remain **OFF.** until the developer is at set temperature.
2. During operation, the next piece of film may be fed into the processor only when the light is ON.
3. If a low level exists the lamp will turn OFF.

Controls & Indicators

4. Feed Signal

The ***Feed Signal*** is an audible "Beep" that sounds when it is safe to feed another piece of film.

5. Developer Temp.

Sets the working temperature of the developer. The available range is 65 (ambient) to 110 degrees *f* (18 - 43 C.) An overheat thermoswitch, located in the heater tube, see Figure 3-6, opens if the temperature exceed 165 degrees *f* (74 C.). The overheat switch resets automatically as the temperature drops to a safe level.

6. Dryer Temp.

Sets the working temperature of the dryer. The available range is 90 degrees (ambient) to 155 degrees *f* (32 - 68 C.). An overheat thermostat, with a manual reset, is also a part of each dryer section, see Figure 3-7 for location(s).

7. Film Feed Detector

The film detector fingers are attached to the film feed switch. (See Figure 3-4). Feeding film moves the finger(s) and trips the film feed switch. Approximately 4 1/2 minutes after the fingers are released the processor will return to standby mode.

8. Replenishment Pump(s)

The replenishment pump(s) operate at all times when the film feed fingers are actuated. They also run during "Jog" cycle *if* the low volume mode of replenishment is selected. The ***Bulk Add Switch*** will also operate the pump(s). For calibration see Section 5, Service.

9. Wash Water Flow Rate Control

Wash water flow is restricted to 3/4 GPM (3 LPM) by a "Measureflow" device in the incoming water line.

10. Bulk Add Switch

Toggling this switch operates the replenishment pump(s). Use to "Top Off" tanks if a low level condition exists and/or for pump calibration.

Daily Operation

NOTE: Consult your film and chemistry manufacturer's representative for proper film & chemistry handling and quality control procedures. To maintain consistent quality in your radiographs a quality control program must be a part of your daily operating procedure.

Start-Up

1. Turn on the external water supply valve.
2. Check that the replenisher supply tanks have sufficient replenisher in them for the days work, mix and add additional replenisher as required. Check the supply lines for trapped air.
3. Remove the top cover:
    - A. Verify that the replenishment hooks are properly positioned in each tank.
    - B. Using a separate damp cloth for developer and fixer, wipe the dried solution deposits from all exposed roller surfaces.
    - C. Install the cross-overs and splash guard removed at shut-down, see Figure 3-11.
    - D. Replace the top cover, checking that it makes a light tight seal on the processor.
4. Wipe off the feed tray.
5. Turn the *Power Switch* ON.
6. Check the following:
    - A. The drive system is functioning properly. It will run for approximately 4 1/2 minutes and then return to stand-by mode.
    - B. The replenishment pump(s) will cycle and, if the developer solution level is low, continue to run until the low level situation is corrected.
7. Allow the processor to warm up for approximately 15-20 minutes.

Start-Up, Continued

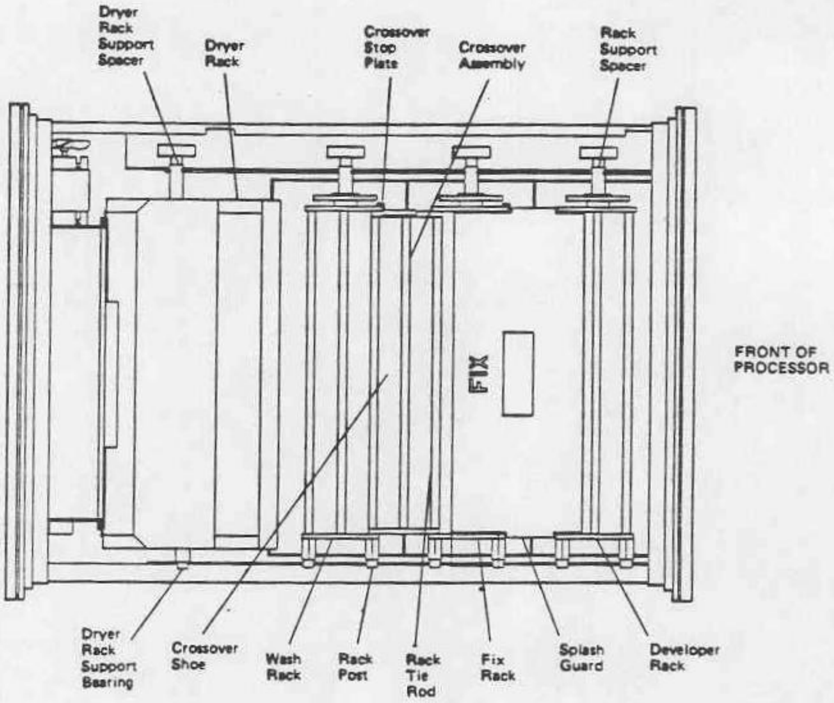

Dryer Rack Support Spacer
Dryer Rack
Crossover Stop Plate
Crossover Assembly
Rack Support Spacer
FRONT OF PROCESSOR
FIX
Dryer Rack Support Bearing
Crossover Shoe
Wash Rack
Rack Post
Rack Tie Rod
Fix Rack
Splash Guard
Developer Rack

Figure 3-11, Top View, Cover Removed

8. Run several 14" wide "Clean-Up" sheets before running any new films.
9. Follow the recommendations of your quality control program to maintain processing quality.

Processing Film

1. When the *TEMP/FEED* indicator is ON the processor is ready to accept a sheet of film. Feed each sheet squarely into the feed slot, making sure it trips at least one of the film detectors.
2. Allow the feed rollers to draw the film into the processor. Wait until the audible "Beep" is heard or until the *TEMP/FEED* indicator is ON before feeding the next sheet of film. DO NOT turn on any lights until either the "Beep" is heard or the *TEMP/FEED* indicator is ON.
3. Approximately 2 1/2 minutes after a piece of film is fed into the processor, it will drop out into the receiving bin.
4. Shortly after the last piece of film is processed, the processor will return to stand-by mode.

Shutdown

1. Turn the ***Power Switch*** OFF
2. Fully close the water supply valve to the processor.
3. Remove the top cover, remove the following parts, thoroughly rinse them with warm water and allow them to dry overnight outside of the processor, see Figure 3-11.
   - A. Splash guard.
   - B. All cross-overs.
4. Using separate damp cloths for developer and fixer, wipe off any solution deposits from the exposed roller surfaces.
5. Carefully wipe down the processor panels and frame, being sure to clean up any chemical splashes or spills.
6. Replace the top cover, leaving it rotated to one side to prevent condensation build up from the still warm chemicals.

Film Jams

In the unlikely event of a film jam, clear it as follows:

1. Turn the ***Power Switch*** off.

   WARNING: Never attempt to clear a film jam with the *Power Switch* ON. Serious injury may occur.

2. Remove the splash guard and cross-overs.
3. Locate the jam and clear it from the rack. If you have to lift any of the racks, take extreme care not to splash or drip chemistry into the adjacent tank. If the jam occurs in the dryer, remove the lift-out section to clear the jam.

   CAUTION: Parts of the dryer can be very hot from operation, allow it to cool before removing the lift-out section.

4. If film jams re-occur in the same area, an inspection to determine the cause should be made.

Film & Chemistry Problems

This section lists processing problems and related causes. There are many variables to film processing, and it is not possible to cover all of them adequately in one section. Your best source on film processing and quality control is the film and chemistry manufacturer. The best assurance of consistent film quality is a routine of quality control which includes daily running of control strips and cleanup sheets, and diligent processor maintenance.

Loss of Film Density

Loss of film density can be caused by the following processing variables:

1. Under-replenishment
2. Incorrect solution temperature (usually too low)
3. Insufficient solution circulation
4. Exhausted or bad chemistry
5. Dirt or deposits on the transport racks.

Increase in Film Density

An increase in film density can be caused by the following processing variables:

1. Over-replenishment
2. Incorrect solution temperature (usually too high).

Film Artifacts

- Mottling (overall area of plus or minus density patches) can be caused by a combination of improper developer circulation and too high or too low a developer concentration. Check chemical mixing procedures, recommended and actual replenishment rates, and the circulation system.

Film Artifacts, Continued

- **Streaks** (bands of plus or minus density) in the direction of film travel can be caused by air bubbles or aerated chemistry, contaminated developer, chemical build-up on rack rollers, and rack guide shoes out of adjustment. Check the chemistry activity with control strips. Check for a transport problem as described in Section 5 under "Diagnosing a Film Scratch".

- **Grease and oil on film** can be caused by drive shaft lubricant getting on the feed tray, transport rollers, or in the chemistry. Clean off any lubricant. Clean the film transport path of all deposits. Check the chemistry and replace if necessary. Apply lubricant very sparingly, to the drive shaft worm gears only.

- **Sticky film** can be caused by under-replenished fix or insufficient wash. Check actual fix replenishment against manufacturer's recommendation. Check the wash water flow and the incoming water line.

- **Stains** can be caused by oil in the chemistry or under-replenished chemistry. Check the chemistry and replenishment rates against the manufacturer's recommendations.

- **Small irregular spots** can be caused by blisters on the rollers. Replace any rollers which are blistered.

- **Dark flames on the end of film** can be caused by chemical runback. Check and adjust the squeegee or exit rollers in the developer rack.

- **Pepper spots** can be caused by artifacts in the solutions or replenisher, or by static electricity. Check the chemistry and replace if necessary. Consult a film manufacturer's representative on ways to eliminate static electricity.

- **Fogged film** can be caused by light leaks or an improper safelight. Fogging along the edges indicates a leak at the edges of the top cover of the processor, if the lights are turned on before film is completely processed.

Section 4
Maintenance

AFP 14X-3
X-Ray Processor

Maintenance Program

Maintenance of the ***AFP 14X-3*** processor consists of cleaning and adjustment operations, routinely performed, to keep it operating correctly. Early in the life of your processor set up a maintenance program, with specific people responsible for performing each maintenance task.

Maintenance Records

Good preventive maintenance is essential to assure a long and trouble free life for your processor. Keeping on-going records of maintenance will help assure that the work is performed when scheduled.

Figure 4-1 is a *Maintenance Schedule* that lists tasks to be performed at prescribed maintenance intervals.

Cleaning

Cleaning is the most important form of maintenance. If chemicals are allowed to accumulate on processor parts they can cause corrosion or other damage which may seriously affect production and output quality.

Perform daily cleaning, as outlined on the *Maintenance Schedule*, Figure 4-1, as part of the shutdown procedure.

Weekly cleaning, described below, should take about thirty minutes following shutdown and daily cleaning.

Monthly Cleaning should take approximately 2 hours more that the weekly cleaning scheduled for the same day.

Caution: Never use harsh abrasive material to clean racks or processing tanks.

Lubrication

Proper lubrication is critical to extended processor life. Over-lubrication and/or improper lubrication will shorten processor life.

Carefully read the instructions for lubrication, Page 4-8, before lubricating any part of the processor.

AFP 14X-3

Maintenance Schedule

Daily

Clean:

Developer Rollers
Top Covers, Side Panels
Feed Tray, Receiving Bin

Check:

Chemical Levels
Replenisher Levels

Weekly

Clean:

Developer & Fix Splash Guards
Wash Tank, if build-up is present
Tank Exteriors

Change:

Water Filter, if equipped

Check:

Lubrication Schedule

Monthly

Clean:

Developer Rack
Developer Filter
Fixer Rack
Wash Rack

Change:

Developer & Fixer, if due.

Check:

Hose Clamps & Plumbing
Rack Bearings
Lubrication Schedule

Figure 4-1, Maintenance Schedule

Weekly Cleaning

1. Remove the top cover.
2. Remove the developer and fixer splash guards and cross-overs. Thoroughly rinse and wipe them off.
3. Check wash tank for evidence of "Algae" (bacterial slime) build-up, if present follow instructions under *Algae Control* on Page 4-7.
4. Check the (optional) external water filter. Replace the filter cartridge (p/n 58-790) if necessary.
5. Clean up any evidence of chemical spills on the tanks and covers.
6. Perform the lubrication steps shown under "Weekly" on the *Lubrication Schedule*, Page 4-8.
7. Replace top cover, leave slightly ajar.

Monthly Cleaning

As film is processed, by-products are released into the developer, fix and wash systems. Every month, schedule two additional hours of processor downtime to thoroughly clean the developer, fixer and wash systems.

NOTE: This cleaning will be in addition to the scheduled Weekly Cleaning due on the same date.

1. Remove splash guards, cross-overs and transport racks. Place when in a sink and rinse then thoroughly. Remove any stubborn deposits or stains using an AFP Pad. NOTE: DO NOT use AFP Pads to clean any rubber roller surfaces.
2. Check with the recommendations of your chemistry supplier and, if due, change the developer and/or fixer. See ***Changing Chemistry*** on Page 4-4 for a recommended procedure.
3. Clean the developer filter element and housing, see *Developer Filter Service* on Page 4-6 for instructions.
4. Perform the lubrication steps shown under "Monthly" on the *Lubrication Schedule*, Page 4-8.

Changing Chemistry

Follow the below listed steps when changing chemistry:

1. Drain the solution tank(s)

2. Remove the splash guard(s), cross-overs and the appropriate processing rack(s) from the processor.

3. Rinse off the above parts with warm water (About 90 degrees *f*, 32 C.) and clean off any chemical deposits. Use an AFP Pad to remove stubborn deposits, but do not use AFP Pads on any of the rubber roller surfaces.

4. Stand each rack upright on a flat surface and check for squareness and that all rack screws are secure. Test each rack by feeding a piece of processed film through while turning the drive gear by hand. If the rack does not turn smoothly or transport properly, correct the problem before returning the rack to service.

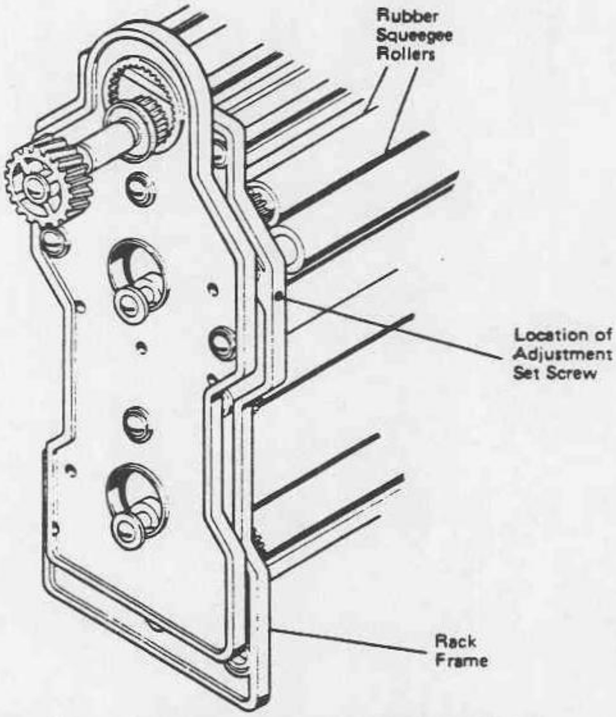


Figure 4-2, Squeegee Roller Adjustment

5. Adjust the rubber squeegee roller on the wash rack by tightening or loosening the set screw in the rack frame just opposite the roller bearings, see Figure 4-2. (Continued on next page)

Changing Chemistry, Continued

A piece of paper inserted between the rollers should just "drag" when the rollers are adjusted correctly. Be sure to check on both ends of the rack to assure that the rollers are parallel.

6. Rinse and flush the tanks and circulation lines with warm water. When normal rinsing is not adequate, the use of a systems cleaner, such as KLENE-OX (AFP p/n 55-53) is recommended. When using systems cleaners be sure to carefully follow the instructions on the package.

   WARNING: Systems cleaners such as KLENE-OX contain sulfamic acid or other equally hazardous chemicals. Do not allow any of these chemicals to come into contact with your skin. In case of contact rinse the affected area with running water for at least 20 minutes. If any of these chemicals enter your eyes, ears, nose or mouth, obtain medical attention immediately.

   Note: Do not soak any of the rubber rollers in systems cleaner, use only as directed on the package label.

   As a precaution, always rinse the processor tanks and lines thoroughly several times after using systems cleaner.

7. Remove and clean the developer filter and housing as described on Page 4-6.

8. Rinse the replenisher tanks and lines with warm water.

9. Reinstall the racks, cross-overs and splash guards.

10. Remove the rear (lift-out) section of the dryer and wipe down the entire dryer area with a damp cloth. Wipe down the dryer rollers with a damp cloth.

11. Vacuum out the entire dryer section.

12. Reinstall the lift-out dryer section

13. Generally wipe down the entire processor, looking for indications of leaks or chemical residue build-up. Clean and correct as necessary

Developer Filter Service

The *AFP 14X-3* is equipped with a serviceable element developer filter. The filter is located on the left side of the processor, directly under the wash tank.

The developer filter should be serviced, monthly or each time the developer is drained and replaced, which ever occurs more often, as outlined below.

Caution: Failure to follow these steps exactly as listed can lead to chemical leakage and damage to the processor.

1. Remove the top cover and the left side panel from the processor.
2. Turn **both** developer flow control valves, located on the input and output lines to the filter, to the **OFF** position.
3. Loosen the filter mounting clamp 2 full turns and remove the filter assembly from its mount.
4. Place paper towels or cleaning cloths under the filter cartridge to absorb any developer spilled or splashed during servicing.
5. Firmly grasp the upper housing in one hand and the lower housing in the other hand. Carefully unscrew the lower housing and remove it, with the filter element inside, from the processor.
6. Using warm water, carefully rinse out the lower housing and the filter element. If any debris remains, soak the element until it rinses clean.
7. Remove and clean the sealing "O" ring from the top of the housing. Coat the "O" ring with a silicon lubricant and replace it on the housing.
8. Re-install the lower housing and element in the processor, tighten only hand-tight. Position the filter assembly in its mounting clamp and tighten the clamp.
9. Open the two flow valves connected to the filter housing.
10. Start the processor and inspect for leaks around the housing seal and hose connections.

Algae Control

Algae, or, more correctly, "Bacterial Slime" will, under certain conditions, build up in the wash tank. The following techniques will help reduce or eliminate this problem.

1. Be sure the wash tank drains each time the processor is shut down. Leave the top cover open slightly to assure a rapid dry-out of the wash tank.

   If the processor is in continual use (24 hours a day), drain it at least once a day and clean it thoroughly on a weekly basis if slime build-up is a problem.

2. Use filtered cold water for wash.

3. Thoroughly rinse and scrub all surfaces in the wash tank on a regular basis.

If slime is not controlled by the above techniques, rinse the wash tank weekly using the following procedure:

1. Drain the wash tank, remove the rack.

2. Fill the tank with warm water and add 1/2 oz. (15 ml) of sodium hypochlorite such as "Clorox" brand household bleach. Allow to sit for 1/2 hour, then drain and thoroughly rinse the tank. If this is not effective increase the sodium hypochlorite, in 1/2 oz. (15 ml) increments up to a maximum of 2 oz. (60 ml) per tank full of water to control the slime build up.

WARNING: The use of sodium hypocholrite (bleach) as a cleaning agent must be controlled very carefully. When combined with fixer this product will release chlorine gas which, in a confined area, can be fatal.

1. DO NOT use this product in any other area of the processor under any circumstances.

2. DO NOT exceed the maximum recommended concentration.

3. DO NOT add to existing wash water. Use only as directed above.

Lubrication

Proper lubrication is critical to the performance and long life of the processor. Read all of the following instructions before attempting any lubrication of the processor.

Removing Old Lubricants

Dust and dirt, mixed with oil or grease, can prevent fresh lubricants from reaching the surfaces that need it most.

Before applying new lubricant, always clean away any accumulation of old grease and/or oil.

Lubrication Schedule

Note: Use caution when applying lubricant so as to not drip any lubricants into the chemistry causing contamination. Lubricate as indicated below:

Weekly

1. Apply a thin coat of SAE-30 oil to the drive chain, see Figure 4-3. Be careful not to drip any oil on the electrical wiring.

2. Apply a moderate amount of AFP-8827 grease to the plastic running gears of the drive shaft, see Figure 4-4.

Monthly

1. Apply a thin coat of AFP-8827 grease to each of the wet section rack drive shafts under the support spacers, see Figure 4-5, and to the dryer drive shaft under the support bearings, see Figure 4-6.

   Note: A thin film of lubricant is all that is required. Excessive lubrication will travel along the drive shaft and into the chemistry.

Quarterly

1. Add several drops of SAE-30 oil to the output shaft bearing on the drive motor reducer, see Figure 4-3.

Lubrication Schedule, Continued

Semi-Annual

1. Add a moderate amount of AFP-8827 grease to the drive shaft thrust bearing, see Figure 4-4.

Every 5 Years

1. Clean out the drive motor reducer housing and refill to approximately 3/4 full with Hodson No.2-1000 No-Melt Grease (or equivalent).

2. Repack the drive motor bearings with Beacon No. 325 Ball Bearing Grease (or equivalent).

Lifetime Lubricated Parts

The following are factory lubricated for the life of the component. Additional lubrication may contaminate the factory lubrication and shorten service life.

1. Main driveshaft bearings.
2. Dryer blower motors.
3. Replenisher pump motor.
4. Muffin fan(s).

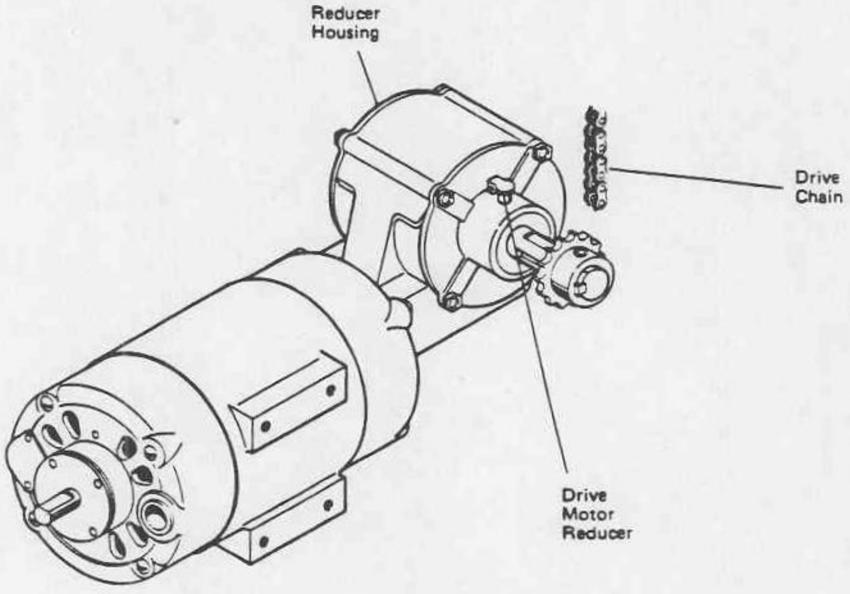


Figure 4-3, Drive Motor

Lubrication, Continued

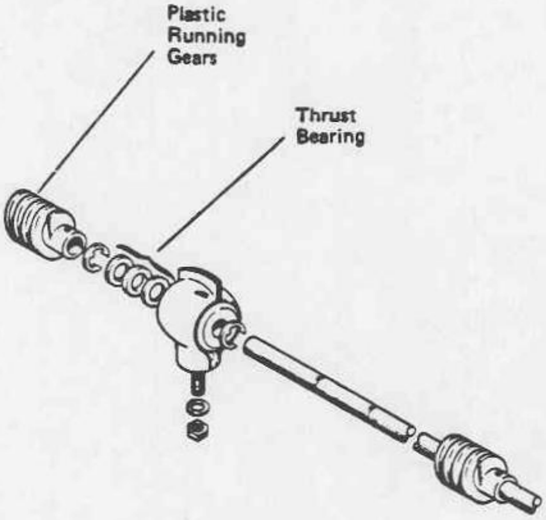

Plastic Running Gears
Thrust Bearing

Figure 4-4, Drive Shaft

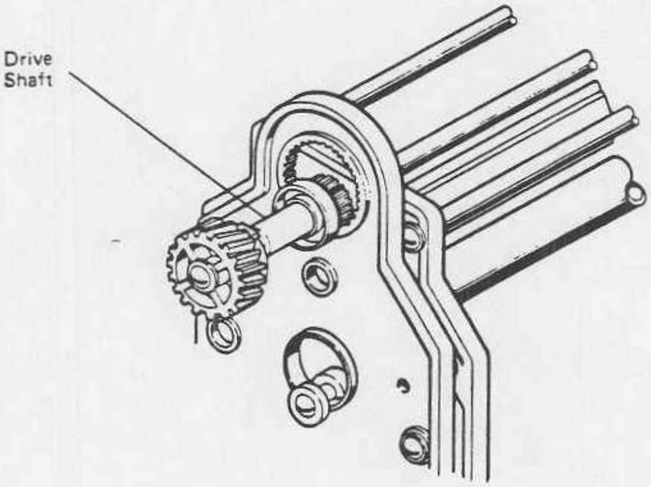

Drive Shaft

Figure 4-5, Wet Section Rack

Lubrication, Continued

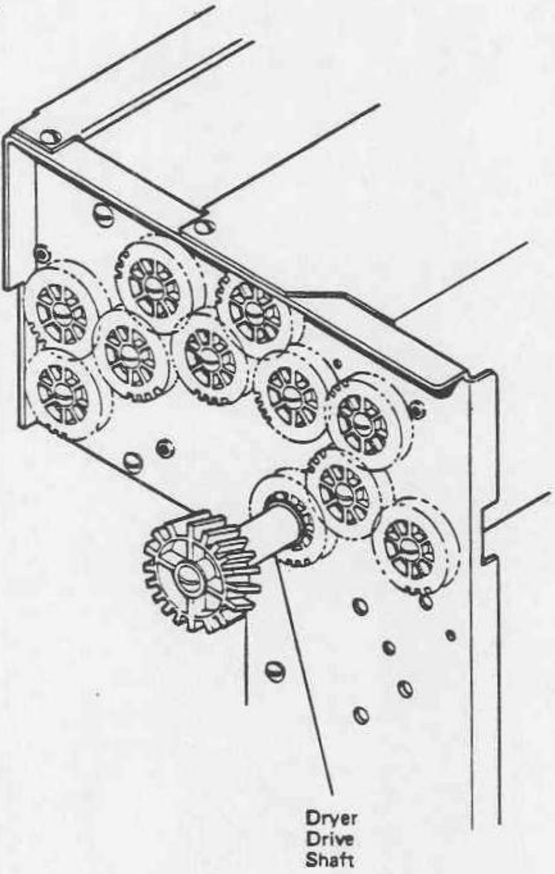

Dryer
Drive
Shaft

Figure 4-6, Dryer Rack

Notes:

Section 5

Service

AFP 14X-3

X-Ray Processor

Table of Contents
Section 5, Service

Technical Specifications 5-III
Long Term Storage Requirements 5-V
Composite View(s) 5-VI

General Information **5-1**

Preventive Maintenance **5-2**
Preventive Maintenance Check-Out 5-3

General Electrical Problems **5-6**
How to Check a Relay 5-6
Power Supply & Fuse Testing 5-8
Feed Indicator & Audible Signal 5-10
Film Feed Switch 5-14
Timing Problems 5-15
Developer Level Detector 5-16

Film Transport Problems **5-17**
Film Jams 5-17
Roller Marks 5-18
Film Scratches 5-18

Solution Racks **5-19**
Rack Disassembly/Reassembly 5-21
Squeegee Roller Adjustment 5-22
Splash Guard 5-23
Crossover Assemblies 5-23
Dryer Rack 5-23
Problem: No Drive (Diagnostic Chart) 5-24
Drive System Failure 5-25

Circulation Problems **5-28**
Lack of Circulation 5-31

Wash Tank Problems **5-35**
Wash Drain Solenoid 5-37
Algae Control 5-38

Replenishment Problems **5-39**
Problem: No Replenishment (Diagnostic Chart) 5-40

Temperature Problems **5-44**
Problem: No Warm-Up or Heat (Diagnostic Chart) 5-46
Developer Heater Check 5-48
Dryer Heater Check 5-49
Triac Testing 5-52
Temperature Sensor Testing 5-53
Developer Sensor Removal 5-53

Table of Contents
Section 5, Service

Dryer Sensor Removal 5-54
Temperature Dial Test 5-54
Temperature Calibration 5-55
Blower Motors 5-56

Technical Descriptions and Theory of Operation **5-56**

Schematics **5-71**

Illustrations

Composite Views 5-VI
Power Chassis Components, Figure 5-1 5-8
Current Draw of Fused Circuits, Figure 5-2 5-9
Adjustments & Test Points, PC Boards, Figure 5-3 5-10
Signal Flow Diagram of Timing Circuit, Figure 5-4 5-11
Level Detector Probes, Figure 5-5 5-12
Film Switch, Figure 5-6 5-14
Film Switch Check, Figure 5-7 5-14
Top View of Processor, Figure 5-8 5-17
Shoe Assemblies, Figure 5-9 5-20
Squeegee Roller Adjustment, Figure 5-10 5-22
Diagnostic Chart, Drive System Failure, Fig. 5-11 5-24
Drive Motor (Exploded View) Figure 5-12 5-26
Drive Chain Adjustment, Figure 5-13 5-27
Drive Shaft, Figure 5-14 5-27
Schematic Diagram, Internal Plumbing, Figure 5-15 5-28
Wash Fill Solenoid Location, Figure 5-16 5-29
Plumbing Components, Figure 5-17 5-30
Drain Valves, Figure 5-18 5-30
View of Circulation Pump Head, Figure 5-19 5-33
Water Solenoid & Flow Restrictor, Figure 5-20 5-36
Wash Drain Solenoid, Figure 5-21 5-37
PC Boards, Figure 5-22 5-39
Diagnostic Chart, Replenishment System Failure, Figure 5-23 5-40
Signal Flow, Replenishment Circuit, Figure 5-24 5-41
Replenishment Pumps, Figure 5-25 5-42
Adjustment & Test Points/PC Boards, Figure 5-26 5-44
Flow Chart, No Heat Condition, Figure 5-27 5-46
Signal Flow Diagram, Temp. Ckt., Figure 5-28 5-47
Location, Dev. Heat Safety Thermostat, Figure 5-29 5-48
Location, Terminal Strip TS3, Figure 5-30 5-50
Front Dryer...Reset Button, Figure 5-31 5-51
Lift Out Dryer...Reset Button, Figure 5-32 5-51
Triac Check Points, Figure 5-33 5-52
Temperature Sensor Resistances, Figure 5-34 5-53
Developer Sensor Assembly, Figure 5-35 5-54

Technical Specifications

Dimensions:

Length: 46 1/2" (118 cm.)
Width: 23 5/8" (60.0 cm.)
Height: 23 1/2" (59.1 cm.

Operating Weight:

535 lbs. (243 kg)

Size Film Accomodated:

4 X 4 in. (10 X 10 cm.) up to 14 X 36 in. (35 X 91 cm.)

Dry to Dry Processing Time:

2 minutes 6 seconds, ±3 seconds.

Tank Capacities:

Developer: 3 3/4 gallons (14 liters)
Fixer: 3 3/4 gallons (14 liters)
Wash: 4 gallons (15 liters)

Plumbing Connections:

Drain: 1" (2.5 cm.) I.D. Plastic Pipe. 3 gallons (11 liters) per minute minimum capacity

Water: 3/4" (1.9 cm.) Standard Washing Machine type connection with Quick Disconnect Adapter. 1/4 gallon (1 liter) per minute operating consumption.

Electrical Power Requirements:

115 VAC, 1 Phase, 2 Wire plus gnd, 15 amps.
220 VAC, 1 Phase, 2 Wire plus gnd, 7.5 amps.
50 or 60 hz. (Configured at installation)

Technical Specifications, Continued

Fuses:

F1	1.5 amp, Logic Circuit
F2	5.0 amp, Replenisher Curcuit
F3	5.0 amp, Blower Circuit
F4	5.0 amp, Drive/Wash Circuit

Current Draw: (Nominal amperage ±6 percent.)

Component	Amps @ 220 VAC	
Vent Fan	.08	
Drain Solenoid	.10	
Wash Solenoid	.12	
Developer Heater	6.00	
Circulation Pumps (2)	.36	(Total)
Dryer Heaters (2)	5.90	(Total)
16 VAC Transformer (Pri)	.12	
(Sec)	.50	
Replenisher Pump	.60	
Blower Motors (2)	1.50	(Total)
Drive Motor	.85	
Machine Total	9.80	

Air Conditioning Heat Load: (Approximate)

At 60 Hz	Run Mode	Standby Mode
Latent Heat	2384 Btu/hr	1272 Btu/hr
Sensible	2629 Btu/hr	1502 Btu/hr
Total Heat	5013 Btu/hr	2774 Btu/hr

Long Term Storage & Inspection

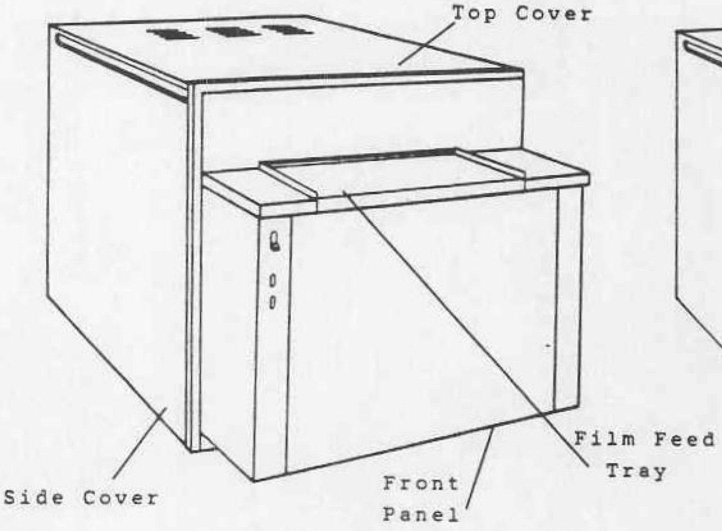
The processor may be stored indefinitely, as shipped, indoors without requiring air conditioning or other temperature controls. Outdoor storage would require the units be protected from precipitation by waterproof tarpaulin or other comparable covering. No adjustment to calibration or other settings are required during storage.

Certain elastomer items, specifically o-rings, replenishment pump bellows and poppet valves have a projected shelf life for 60 months. They should be examined for loss of resiliency at this time interval and replaced if necessary.

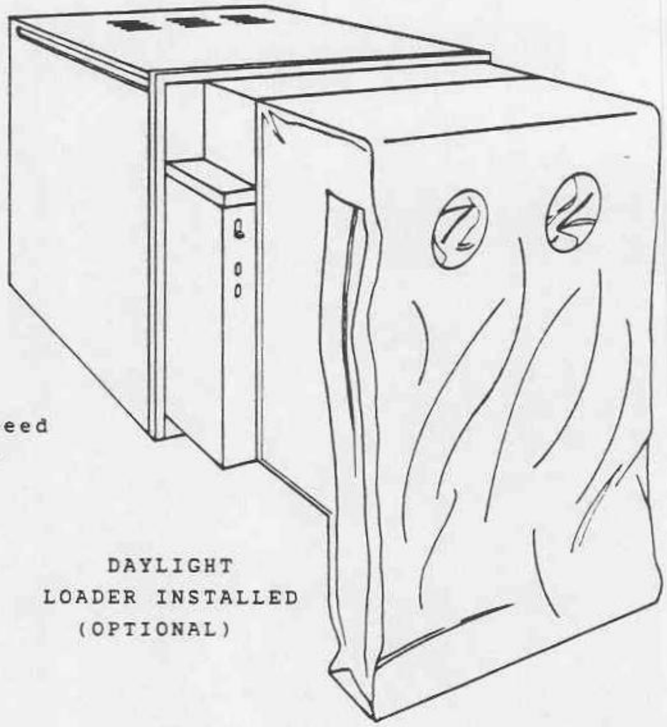
These parts are listed below:

Item	Location	Quan. Unit	Vendor p/n	AFP p/n
O-Ring	Dev. Temp. Sensor	1	Parker 2-008E540-80	81365
O-Ring	Replen. Pump	4	Parker 2-016E540-80	85912
O-Ring	Replen. Pump	4	Parker 2-021E540-80	87401
Bellows	Replen. Pump	1	Gorman Rupp 12945-002	86583
Bellows	Replen. Pump	1	Gorman Rupp 12945-004	87745
Valve	Replen. Pump	4	Gorman Rupp 12935-002	85913
O-Ring	Recirc. Pump	2	Parker 2-027E540-80	91082
O-Ring	Recirc. Pump	2	Parker 2-031E540-80	91098

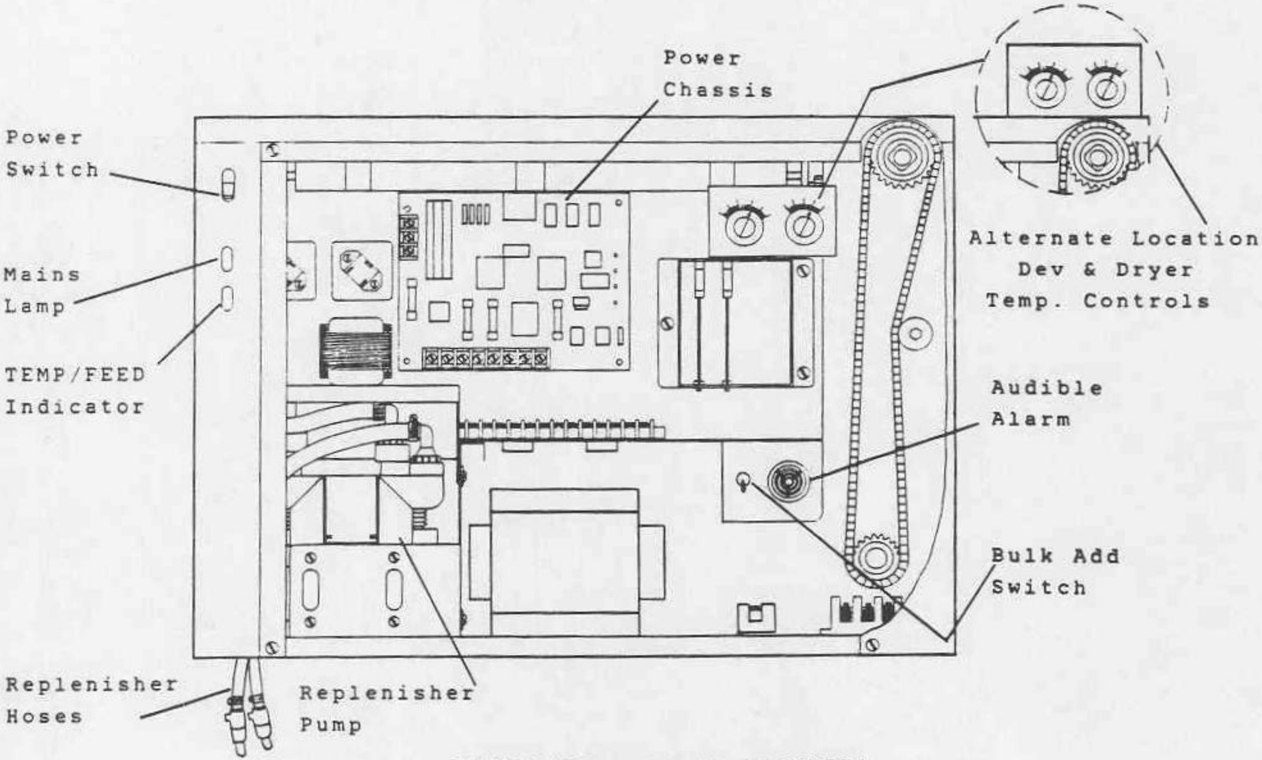
Composite View(s)


Top Cover
Side Cover
Front Panel
Film Feed Tray

FRONT VIEW

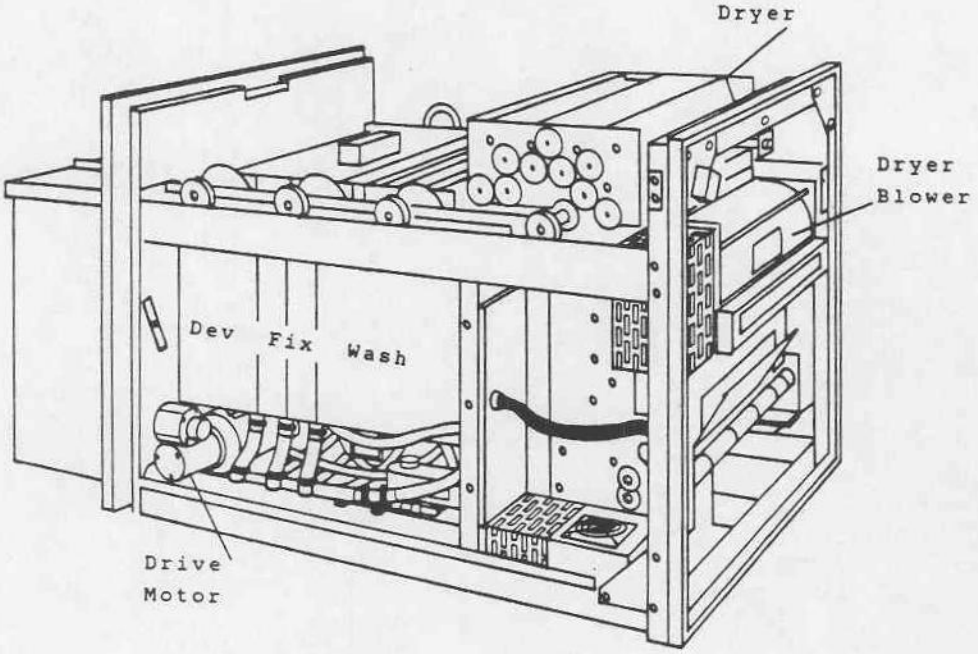


DAYLIGHT LOADER INSTALLED (OPTIONAL)

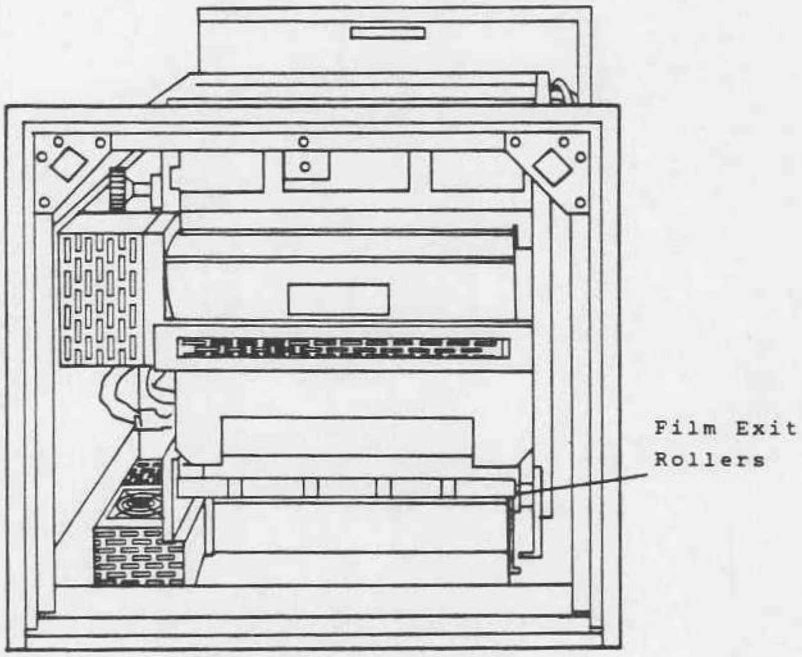

Power Chassis
Power Switch
Mains Lamp
TEMP/FEED Indicator
Alternate Location Dev & Dryer Temp. Controls
Audible Alarm
Bulk Add Switch
Replenisher Hoses
Replenisher Pump

FRONT VIEW (PANEL REMOVED)

Composite Views


Dryer
Dryer Blower
Dev
Fix
Wash
Drive Motor

SIDE VIEW


Film Exit Rollers

REAR VIEW

Service

Notes:

General Information

Introduction

This manual is for use by an authorized AFP distributor service representative. It contains information to aid in the maintenance and repair of the *AFP 14X-3* Film Processor. A general operating description of the processor appears in ***Section 3, Operation.***

Notes:

Problems in processing may be caused by the complex and varied types of processing chemicals and sensitized goods, rather than the processor itself.

Before calling an AFP service person, refer to the Technical Bulletins which apply to the materials you are using. These bulletins contain important information regarding shelf life, pH, specific gravity, chemical usage and turnover, and other key elements in your operation. If you do not have this information, contact the local representative of the materials manufacturer.

How to Use This Section

If you do not know the possible cause of a problem, it is recommended that you review the *Table of Contents* for *Section 5, Service* on page 5-I, to locate a topic related to the problem that you are experiencing.

If you can relate a problem to a processing variable, such as film transport, solution circulation, temperature, or replenishment, use the *Table of Contents* to direct you to the procedure(s) that relates to that variable.

Film and Chemistry Problems, that may be caused by the film processor, are covered in detail in *Section 3, Operation*, Pages 3-15 to 3-17. In most cases a trained service person knowledgeable in x-ray processing, or the particular film and chemical manufacturer's representative, is the best person to help solve film and chemistry problems.

Tools

It is recommended that you have the following tools on hand before attempting troubleshooting or repairs on the processor.

Wrenches
Standard Screwdrivers
Volt-Ohmmeter or Digital Multimeter
Allen Wrenches
Process Thermometer (metal, not mercury)
Part No. 87694 Pin Extractor

Parts Replacement

When replacing worn parts, use only AFP replacement parts, available from your local AFP authorized distributor. Refer to ***Section 6, Parts,*** for specific part numbers. Always mention the serial number and model number of your processor when ordering parts or service.

Point of View

Except where noted, all references to direction (left, right, front, and rear) are as viewed from the operator's position at the loading end of the processor.

Preventive Maintenance

Preventive Maintenance is critical to long and satisfactory processor performance.

Section 4, Maintenance, covers the recommended, operator level, routine preventive maintenance program for this processor in detail.

A more comprehensive **Preventive Maintenance Checkout** procedure, intended for technician use, follows.

Preventive Maintenance Checkout

Following is a listing of *Technician* level preventive maintenance procedures that are recommended for a comprehensive preventive maintenance check-out of an operating processor.

WET SECTION

Racks and Crossovers

1. Clean all racks, crossovers, and the splash guard.
2. Check the gears, pins, bearings, and other wear surfaces.
3. Check the rollers for wear or excessive build-up of residual matter.
4. Check for worn or warped film guides.
5. Check for loose fasteners.
6. Check transport of film through racks individually.

Tanks

1. Clean tanks. Check for algae build-up.
2. Check for evidence of leakage.

Drive Shaft

1. Check mesh with rack gears.
2. Lubricate drive shaft thrust bearing.
3. Check and grease plastic running gears on shaft (Part No. 8827).

Drive Motor and Chain

1. Check for correct chain tension.
2. Lubricate drive chain.
3. Lubricate output shaft bearing on the drive motor reducer (Part No. 8827).
4. Check motor operation and amp draw (see Figure 5-2).

P.M. Check-out, Continued

Circulation System

1. Check for clogged circulation lines.
2. Check for evidence of leakage.
3. Check for circulation of tank solutions.
4. Check for proper water solenoid activation.

DRYER SECTION

Transport Rack

1. Clean off rack rollers.
2. Lubricate the dryer drive shaft bearings beneath the support bearing.
3. Check for worn bearings and springs.
4. Check film transport through rack.
5. Vacuum entire dryer section.

Air System

1. Clean blower and air ducts.
2. Clean blower motor and check operation.
3. Check amp draw of blower motor.

ELECTRICAL SYSTEM

Front Panel

1. Check fuses.
2. Check film switch activation.

Transport Timing

1. Check FEED indicator and audible signal timing.
2. Check for transport shutdown approximately 2-1/2 minutes after film exit.
3. Check for jog function.

P.M. Check-out, Continued

Temperature Control

1. Check actual temperatures against dial settings.
2. Check amp draw of developer and dryer heating elements. (See Figure 5-2)

Replenishment System

1. Check for proper pump activation.
2. Clean storage tanks and flush lines.
3. Check replenishment rates.
4. Check amp draw (see Figure 5-2).
5. Check and clean level probes in developer tank.

GENERAL CLEANING

1. Clean off deposits under tanks.
2. Clean top cover.
3. Clean feed tray.
4. Check and clean base cabinet.
5. Check external water filter (if used) and replace if necessary.

General Electrical Problems

WARNING: The electrical check-out procedures given in this manual are intended for use by a qualified service person only. Always disconnect the power cord before beginning any check of the electrical system.

Guidelines for Checking the Electrical System:

1. Always check for mechanical problems first. Most problems are caused by lack of maintenance, not electrical component failure. Look for the obvious cause of a problem and remedy it.
2. Observe the processor under operation. Observe operator handling and operating environment. Ask questions about its performance in order to more quickly diagnose its problems.
3. Check for loose connections, corroded ground screws, and broken or frayed wires. Clean terminal connections and plug contacts, and tighten them to be sure of good electrical contact.
4. A PC board can be checked by observing the card edge LEDs during operation. Try to isolate the PC board from other components, and then check the other components before condemning the PC board.
5. The resistance, voltage, and amp readings given in this manual are all approximate. If the readings are close, the component is probably good.
6. After repairs have been made, perform a *Preventive Maintenance Checkout* as described on Page 5-3. It will help cut down on repeated service calls.

How to Check a Relay

1. Clean and tighten the terminal connections on a suspected faulty relay.
2. Activate the relay and look for a spark which indicates that the contacts are closing, or touch the top of it with your fingers to feel if the coil is activating.

Relay Check, Continued

3. Refer to the Electrical Diagrams to identify the terminal connections. All the relays have 12VDC coil voltages. the 12v coil circuit is identified in the schematic diagrams by two wires connected to a rectangle, labeled by the relay designation. Remove the coil. Check that the coil voltage is between 12 and 18v when the relay is activated (i.e., when the switch that controls it is thrown).

   If the voltage to either side of the coil is not correct, do not replace the coil until the voltage problem is corrected. Perform the "Power Supply and Fuse Check" in the following paragraph. If the voltage is correct but the relay coil does not activate, substitute another relay and re-test. If the new relay works, the old one was bad.

4. The schematic diagrams identify the relay switch contacts by two wires connected to two parallel lines, labeled by the relay designation. If the parallel lines are unconnected, the contact is normally open, meaning that it is open when the relay coil has no power, and closed only when the coil is energized. If the parallel lines have a slash line across them, then the contact is normally closed. Normally closed contacts are closed when the relay coil has no power, and open only when the coil is energized.

5. Apply power and check that power is present on one side of the relay switch when the switch contacts are open. Check that power is present on both sides of the contacts when the contacts are closed.

   If you suspect the relay contact is bad, substitute another and re-test. Make sure the rest of the circuit is good before condemning a relay.

   NOTE: Since each of the relays uses a different set of contacts, if one of them has a bad contact it may be possible to switch two of the relays temporarily.

Power Supply & Fuse Testing

Perform this check if there is a processor electrical malfunction. This check verifies proper power to machine components.

1. Plug the power cord in. The MAINS indicator should light. If it does not, check the wall electrical outlet, or the secondary taps of the power transformer. The light bulb is probably burned out if the processor works but the indicator does not light.

2. Remove the front cover. Check the four fuses located on the power supply PC board J1, see Figure 5-1.

   Caution: A blown fuse indicates an excessive current draw in the circuit. Always determine the cause of the excessive draw. Never replace fuses with fuses which have higher amperage ratings.

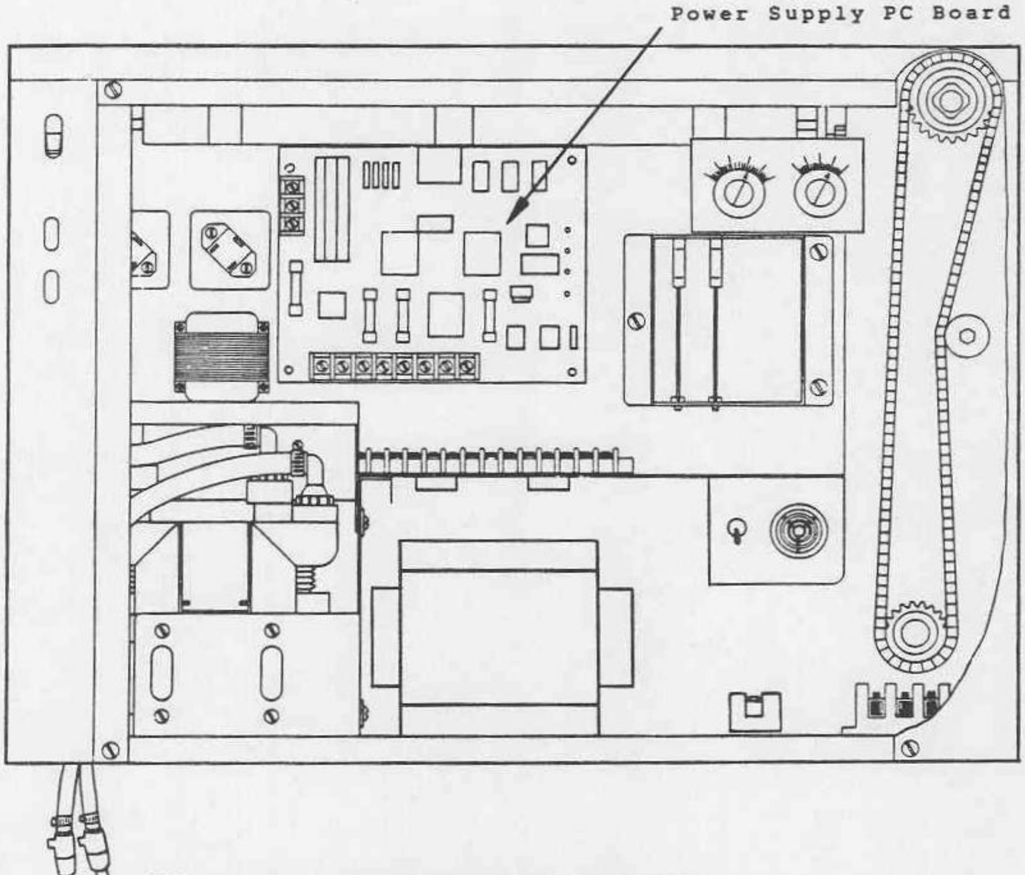


Figure 5-1, Power Chassis Components

Power Supply & Fuse Testing, Continued

Check the current draw on a circuit which blew a fuse. Connect the ammeter leads across the blown fuse. Check current draw in the run condition. Figure 5-2 lists the current draw for each of the circuits. Excessive current draw in a motor circuit usually indicates shorted windings or a frozen armature.

Fuse	Circuit	Amps at 115v 60 Hz*	Amps at 220v 50 Hz*
F1	Transformer	0.5	0.5
F2	Replenisher Pump	0.75	1.0
F3	Blower Motor	3.0	2.0
F4	Drive Motor and Wash Solenoid	1.9	1.0

* All amperage values are nominal and may vary by ±6 percent.

Figure 5-2, Current Draw of Fused Circuits

3. Turn power on. Check for 12 +/-0.5VDC between TP4 and TP1 (common) on the power board J1 (see Figure 5-1). If there is no voltage, check for 16VAC between TS2-3 and TS2-1. If there is voltage at TS2, but not at TP4, check the F1 fuse. If the fuse is good, the power board is not functioning properly and should be replaced.

4. Remove the PC card cage cover (see Figure 5-3). Check for 12 +/-0.5VDC between TP6 and TP1 (common) on the timing PC board J2, and between TP8 and TP1 (common) on the temperature PC board J3. Also check for 20 +/-2VDC between TP7 and TP1 on J2. If any of these voltages are missing, disconnect power, remove the PC boards, and clean the contacts with an eraser. Check the PJ1 connector to make sure it is clean and tight. Reinstall the PC boards and recheck the voltages. Replace a PC board that has a voltage problem.

Power Supply & Fuse Testing, Continued

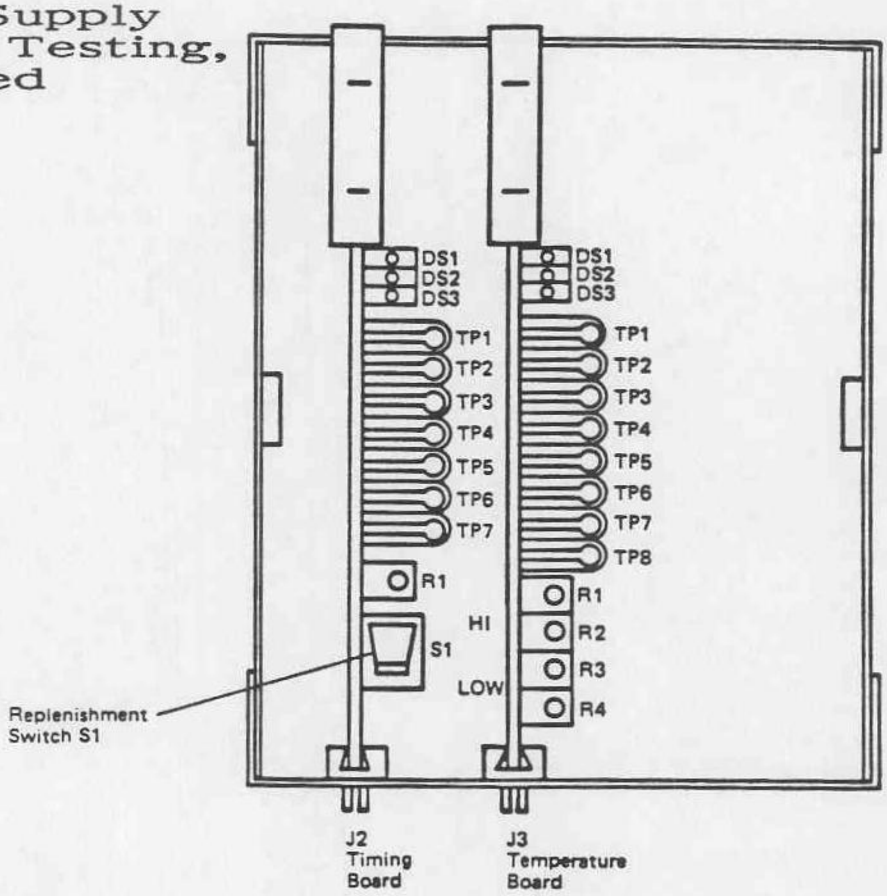

DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
R1
S1
HI
LOW
Replenishment Switch S1
DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
R1
R2
R3
R4
J2 Timing Board
J3 Temperature Board

Figure 5-3, Adjustment and Test Points on PC Boards

Feed Indicator & Audible Signal

The *TEMP/FEED* indicator will not light if one or more of the following conditions is present:

1. There is insufficient developer in the tank.
2. The developer has not reached temperature.
3. The dryer has not reached temperature.
4. The film switch is actuated.

Both the *TEMP/FEED* indicator and audible signal activate at the same time after film has been fed. If the *TEMP/FEED* indicator functions but the audible signal does not, it is likely that the signal is faulty. Disconnect the leads to the audible signal, and hook a penlight battery or an ohmmeter with a 1.5v battery to the audible signal. Observe polarity. The signal should emit a humming sound. If the audible signal functions, but the *TEMP/FEED* indicator does not, it is probably due to a burned-out bulb.

Feed Indicator & Audible Signal, Continued

If the audible signal is producing a faint constant beeping sound, the power supply voltage is incorrect. The supply voltage must be within 6 percent of 115 vac or 220 vac. If you are configured for 220 vac operation it may be necessary to change the transformer output tap. Check with a voltmeter and adjust accordingly.

Failure of the *TEMP/FEED* indicator to light after a sufficient warm-up time should be diagnosed by using the following procedure. The components in the feed and timing circuit are shown in Figure 5-4. The procedure for checking the cause of unusually slow warm-up is the same.

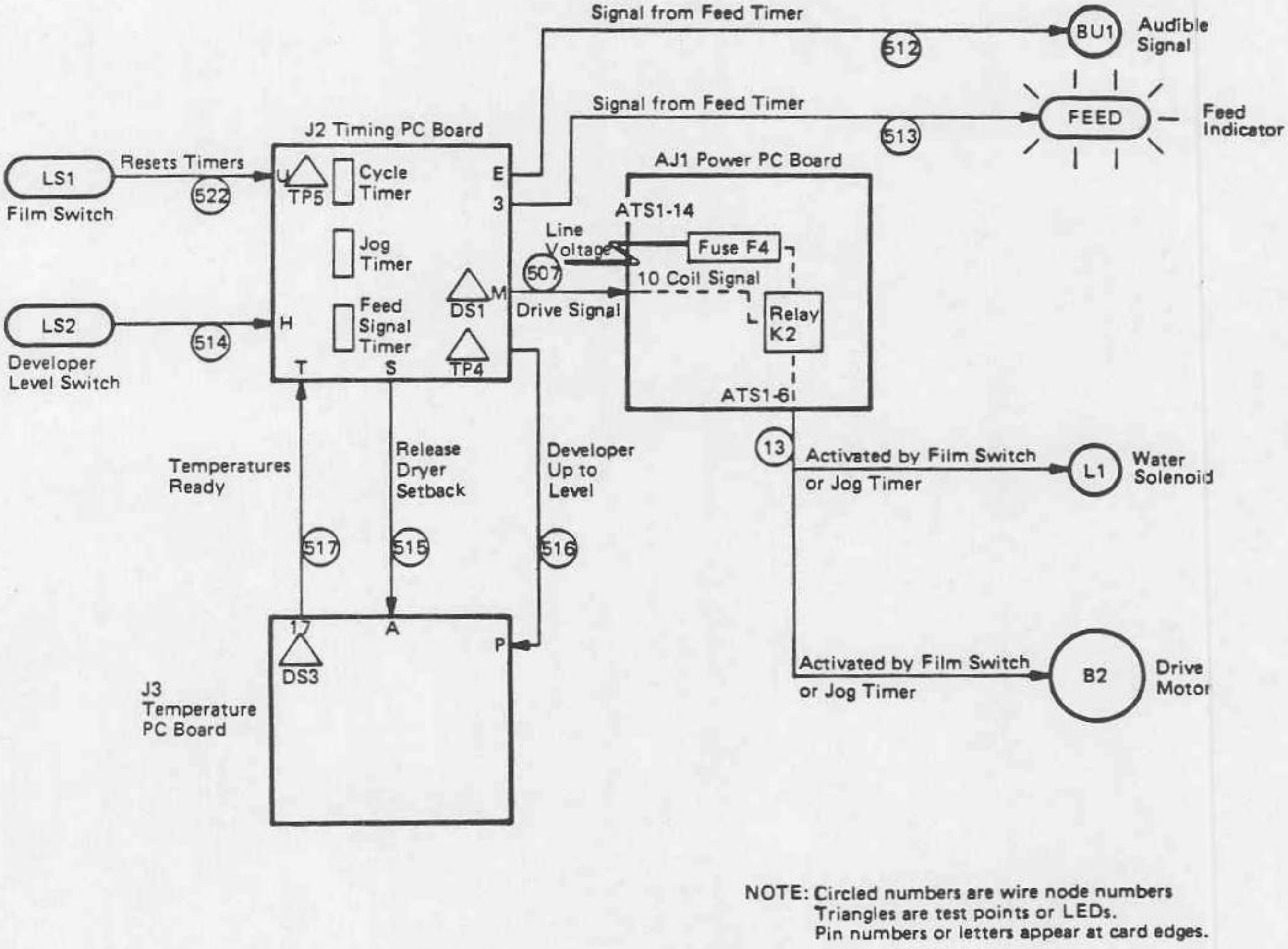

Signal from Feed Timer
512
BU1
Audible Signal
Signal from Feed Timer
513
FEED
Feed Indicator
J2 Timing PC Board
LS1
Resets Timers
522
Film Switch
U
TP5
Cycle Timer
E
3
Jog Timer
Feed Signal Timer
DS1
M
TP4
LS2
514
H
Developer Level Switch
T
S
AJ1 Power PC Board
ATS1-14
Line Voltage
Fuse F4
507
10 Coil Signal
Drive Signal
L
Relay K2
ATS1-6
13
Activated by Film Switch or Jog Timer
L1
Water Solenoid
Temperatures Ready
Release Dryer Setback
Developer Up to Level
517
515
516
17
A
P
DS3
J3 Temperature PC Board
Activated by Film Switch or Jog Timer
B2
Drive Motor
NOTE: Circled numbers are wire node numbers
Triangles are test points or LEDs.
Pin numbers or letters appear at card edges.

Figure 5-4, Signal Flow Diagram of Timing Circuit

Feed Indicator & Audible Signal, Continued

1. If there is insufficient developer:

   a. Remove the top cover and check the solution levels. If developer is below the level detector probes (see Figure 5-5), the replenisher pump should be running, and should continue to run for 30 sec after the solution level reaches the detector.

   b. If the pump is not running, refer to "Replenishment System Failure" on page 5-39.

   c. If the pump is running, and replenisher is being added but it does not raise the solution level in the tank, the tank is leaking or draining. Check all fittings to make sure they are not leaking solution. Refer to "Diagnosing Leaks" on Page 5-32.

   d. If there is sufficient developer, but the replenisher pump is still running, the level detector is not working. Refer to "Developer Level Detector" on Pge 5-16.

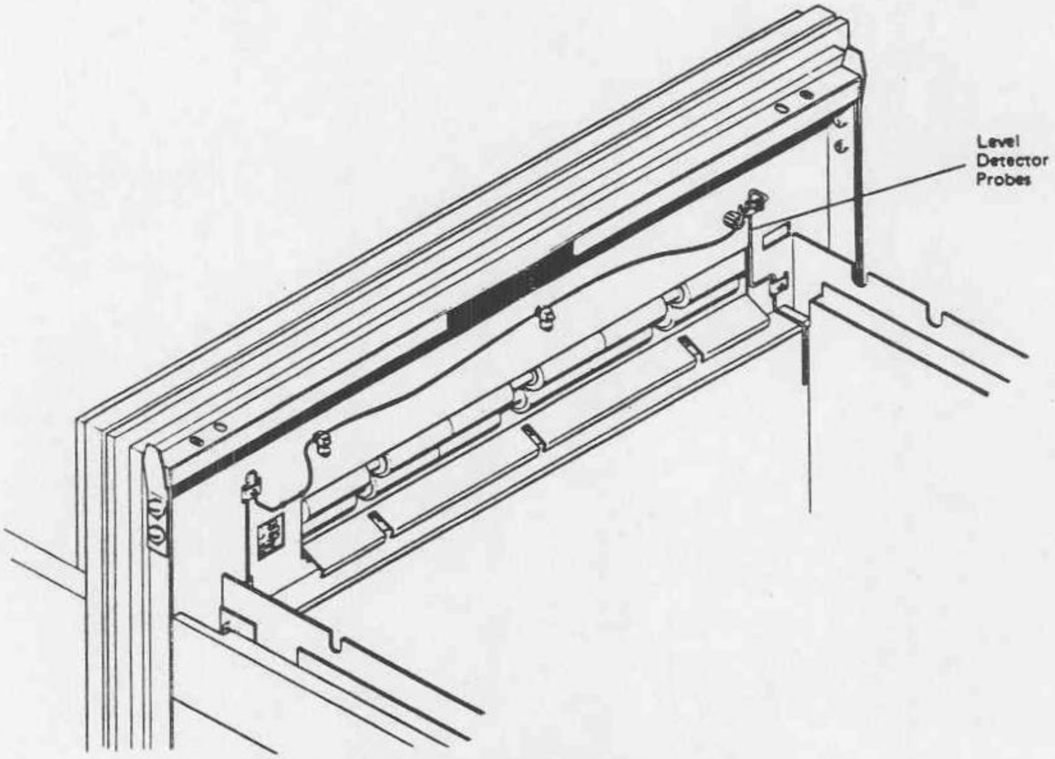


Figure 5-5, Level Detector Probes

Feed Indicator & Audible Signal, Continued

2. If the developer has not reached temperature:

   a. Check the developer temperature with a process thermometer.

      Caution: Do not use a mercury thermometer. It may break and contaminate the tank.

      If there is no heating, refer to "Temperature Problems" on Page 5-44, if the replenisher pump is still running, the problem could be the developer level detector. see Page 5-16.

   b. If the thermometer shows that the solution is being heated, check for adequate circulation. Also check the water temperature and ambient (overnight) air temperature. Room temperature and extremes in incoming water temperature can inhibit warm-up.

      NOTE: The top cover of the processor must be in place during warm-up.

3. If the dryer has not reached temperature:

   a. Check that the dryer is plugged in.

   b. Refer to "Temperature Problems" on Page 5-44.

4. If the film switch is activated:

   It is possible, though not likely, that the film switch is stuck. Check for free movement of the switch. If the switch does not activate the drive system when pressed, refer to "Film Switch" on Page 5-14 and "Timing Problems" on Page 5-15.

Film Feed Switch

The film feed switch consists of two or three sensor fingers attached to a rod over the film feed slot (see Figure 5-6). A counterweight rotates the fingers back up after they are released. The switch itself is located on the left end of the rod. The switching point can be adjusted by loosening the nylon actuating block to change the switching point, and retightening the fastener. Remove the front panel to gain access to the film switch.

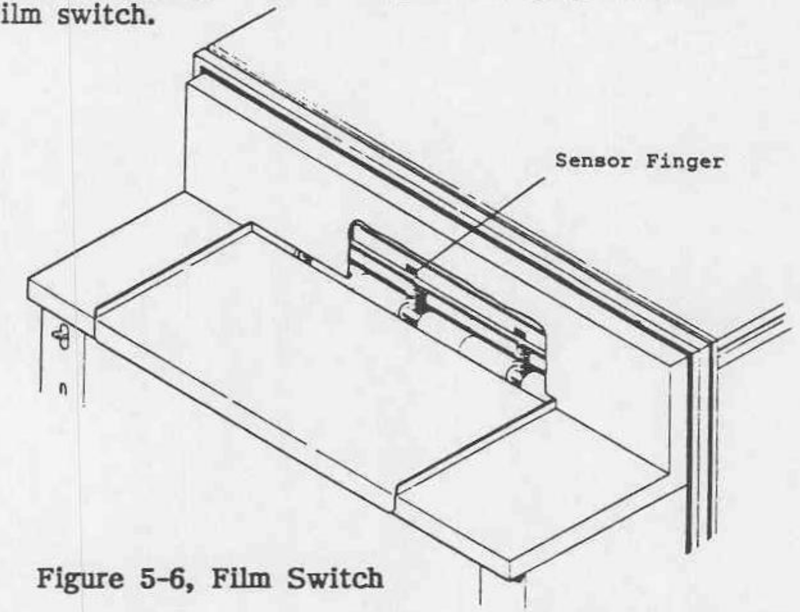


Figure 5-6, Film Switch

Check the film switch by measuring the voltage or resistance as outlined in Figure 5-7. Replace if faulty.

Test	Test Points	Reading	Condition
Voltage	TP5 and TP1 on PCB J2	12VDC 0VDC	Switch depressed Switch released
Resistance	NO and COM at switch, leads disconnected	0 ohms infinite ohms	Switch depressed Switch released

Figure 5-7, Film Switch Check

Timing Problems

The timing PC board J2 has three timers for the film processing sequence (see Figure 5-4). Each timing function can be checked with a watch. If a timing function is not correct, check for a drive signal at LED DS1 of PC board J2. DS1 should light when the timers activate the drive system. If it does light, there is no problem with the timers. Refer to "Drive System Failure" on Page 5-25. If DS1 does not light, perform the "Power Supply and Fuse Check" . If the power supply is good, the J2 PC board is faulty and should be replaced.

Cycle Timer

The cycle timer counts for 4-1/2 min. The timer starts counting when the film switch is released by the trailing edge of film. After 4-1/2 min the drive motor and wash solenoid are turned off. The cycle timer resets and starts again each time the film switch is activated by film.

When the power switch is first turned ON, the drive motor and wash solenoid activate and the timer counts for 4-1/2 min and shuts the system off, as with the film-activated cycle. This fills the drained wash tank.

Feed Signal Timer

The feed signal timer starts counting as soon as the film switch is released. It counts 2-1/2 sec and then turns on the *TEMP/FEED* indicator and sounds the audible "beep" signal. This timer resets and starts counting each time the film switch is depressed and released. If the temperature of the developer solution or dryer decreases below the set point, or the solution level switch senses low solution level, the TEMP-FEED indicator goes out and the feed signal timer is held inactive.

Jog Timer

When film is not in the processor, the jog timer is counting. It starts as soon as the cycle timer completes its count, and counts for 3 min. After each 3 min interval, the jog timer activates the drive motor and wash solenoid for 9 sec. In the low volume mode, the replenisher pump also activates for 9 sec. The jog sequence repeats continually as long as film is not fed into the processor.

Developer Level Detector

On the right and left sides of the developer tank are solution level probes (see Figure 5-5). A probe consists of two electrodes, which conduct when they are immersed in solution. The probes are wired to a level detector IC chip on timing PC board J2. The level detector signal feeds the temperature control replenishment and feed indicator circuits.

If developer solution is below level, the developer heater and *TEMP/FEED* indicator are disabled and the replenisher pump is activated. The replenisher pump adds developer until the tank level is even with the probes, and continues for an additional 30 sec to top off the tank. When tank solution is above the probe level, the temperature control and feed indicator circuits operate normally.

NOTE: The *TEMP/FEED* indicator will not light until the developer reheats after the tank is topped off.

A malfunctioning detector circuit can prevent solution and dryer warm-up, and cause the replenisher pump to run continuously. Check the circuit as follows:

1. Remove the front cover and the PC card cage cover.
2. Connect a voltmeter to TP4 and TP1 (common) on the J2 timing PC board (see Figure 5-3).
3. When the detector probes are dry, there should be 0v at TP4. When the probe is immersed, there should be 12VDC.

   NOTE: The probe will work in electrically conductive solution only. It will not work in distilled water.
4. If the detector circuit seems to be malfunctioning, remove the two screws securing the cover over the probe terminals and remove the cover. Disconnect the wires from the probe terminals on the outside of the tank. Check the probe terminals with an ohmmeter. Place one test lead on one of the screws and the other on the probe. If the probe is dry there should be infinite resistance. If not, the screw is too tight and should be loosened. Repeat for the other probe. There should be 0v at TP4 on the J2 timing board when the probes are disconnected.

Film Transport Problems

Film Jams

Possible causes of film jams are:

1. Racks, crossovers, or dryer out of position
2. Film fed at an angle
3. Films fed overlapping
4. Deposits or dirt on racks and crossovers
5. Chemistry that is out of control, causing film to stick to rollers.

Make sure the racks, crossovers, dryer, and top cover are in their proper positions and that the machine operator checks this at the beginning of the work day (see Figure 5-8). Run cleanup sheets through the processor to clean the rollers. Run control strips to make sure the chemistry is good. If the problem is chemistry or film related, consult the sensitized materials manufacturer on quality control procedures.

Observe the operator's routine, to make sure film is fed squarely into the processor, films are not overlapped, and film handling follows the film manufacturer's recommendations.

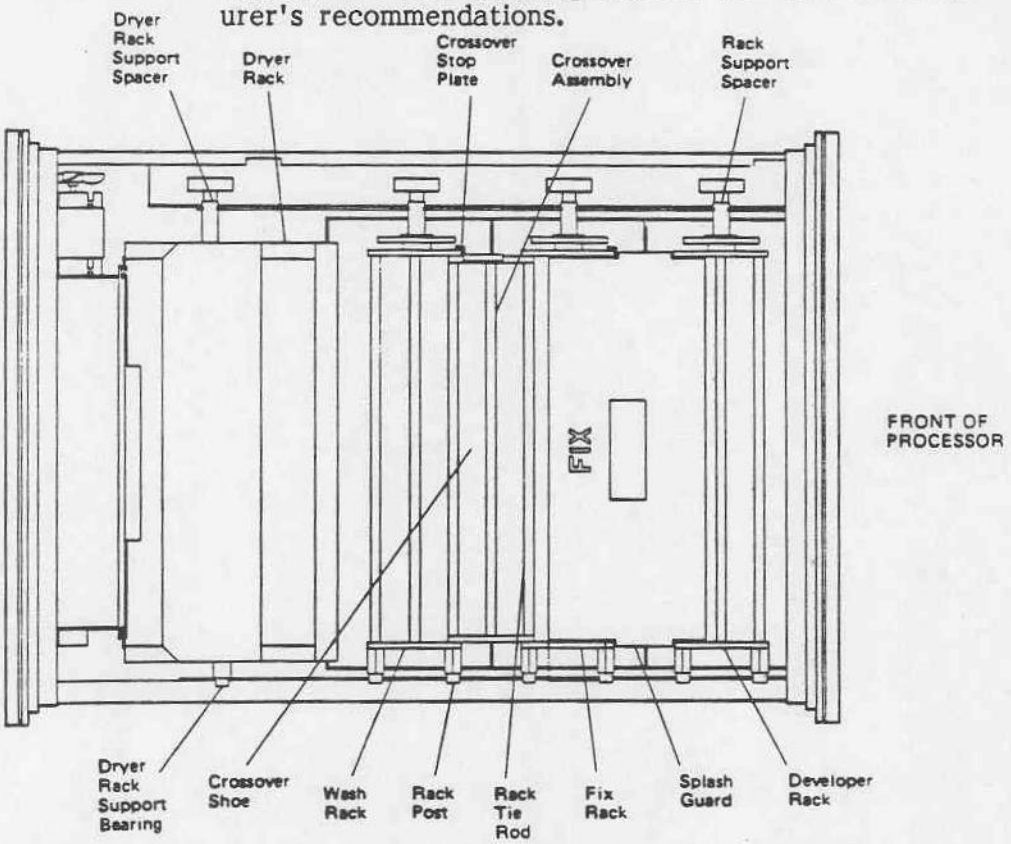

Dryer Rack Support Spacer
Dryer Rack
Crossover Stop Plate
Crossover Assembly
Rack Support Spacer
FIX
FRONT OF PROCESSOR
Dryer Rack Support Bearing
Crossover Shoe
Wash Rack
Rack Post
Rack Tie Rod
Fix Rack
Splash Guard
Developer Rack

Figure 5-8, Top View of Processor (with Cover Removed)

Roller Marks

Roller marks are "plus or minus density" impressions on the film, that are perpendicular to the film path. They are usually at regular intervals along the length of the film. Roller marks occur repeatedly, not just on one sheet of film. If the marks are not predictable from sheet to sheet, they may be the result of film or chemistry problems, and are best solved by a film manufacturer's representative.

Roller marks most likely occur in the first half of the developer rack, where film is most sensitive to impressions. The marks can be on either side of the film. To determine which side of the film a particular mark is on, use household bleach to remove the emulsion from one side. If the marks disappear, they were on that side of the film. This will help you determine whether the marks are made by inner rack rollers (top of film), outer rack rollers, or both.

Film Scratches

Film scratches in the direction of film travel can be caused by plastic or metal parts out of adjustment. A burr, dirt, or dried chemicals on the feed tray, shoe assemblies, or crossovers can also scratch the film repeatedly. Scratches that are not predictable could be caused by sifting dirt in the solution tanks, or film, chemical, or film handling problems that are best solved by consulting the sensitized materials manufacturer.

NOTE: Plus density marks occur before the fix. Minus density marks occur in the fix and after.

As with roller marks, scratches occur most often in the developer rack, where film is most sensitive to impressions. If the scratch occurs to the top of the film, it may be caused by the crossovers or top guide shoes. Similarly, scratches on the bottom may be caused by the guide shoes in the bottom of the rack being out of alignment or dirty.

To find the location of the problem:

1. Remove the fix/wash crossover. Feed a sheet of film. Retrieve the film from the fix rack and inspect it for scratches.

Film Scratches

2. Replace the crossover, making sure it fits correctly. Remove the dryer and repeat the process, adding each component in the film path after film has passed through the previous one. This procedure should isolate the problem. If the problem is in a rack, refer to "Solution Racks" in this section.

Solution Racks

Each solution rack is supported by two rack posts and one support spacer which fit into the processor frame (see Figure 5-9). The solution racks must be correctly seated into the processor frame if the racks are to transport film properly.

Check the operation of a rack as follows:

1. Remove the rack from the processor. When removing a solution rack, lift it by the upper tie rods and not by the rack drive shaft. Be careful not to drip fix solution into the developer. Use a drip tray to prevent solution contamination. Place the rack upright on a flat surface and make sure it is square. The side plates should be flat on the surface. If they are not, loosen the screws on one side plate, press it down flat, and tighten the screws. Repeat with the other side plate.
2. Operate the rack manually and check that it operates freely.
3. Insert a large piece of previously exposed and processed film into the entrance side of the rack, and manually feed the film through the rack. The film must be transported smoothly, without binding or hesitating. If the film is not being transported properly, notice the area in which the trouble occurs. Examine the area for misaligned parts.
4. Inspect the film for scratches or marks. Keep in mind that although the rack may successfully transport the film when dry, it may still cause problems in the processor. If in doubt, perform the "Rack Disassembly/Reassembly" procedure in this section.

Solution Racks, Continued

5. Clean the rollers of a rack with a damp cloth. Use an AFP pad to remove stubborn deposits.

   Caution: Do not use an AFP pad on rubber rollers.

6. Check squeegee roller tension. Refer to "Squeegee Roller Adjustment" in this section.

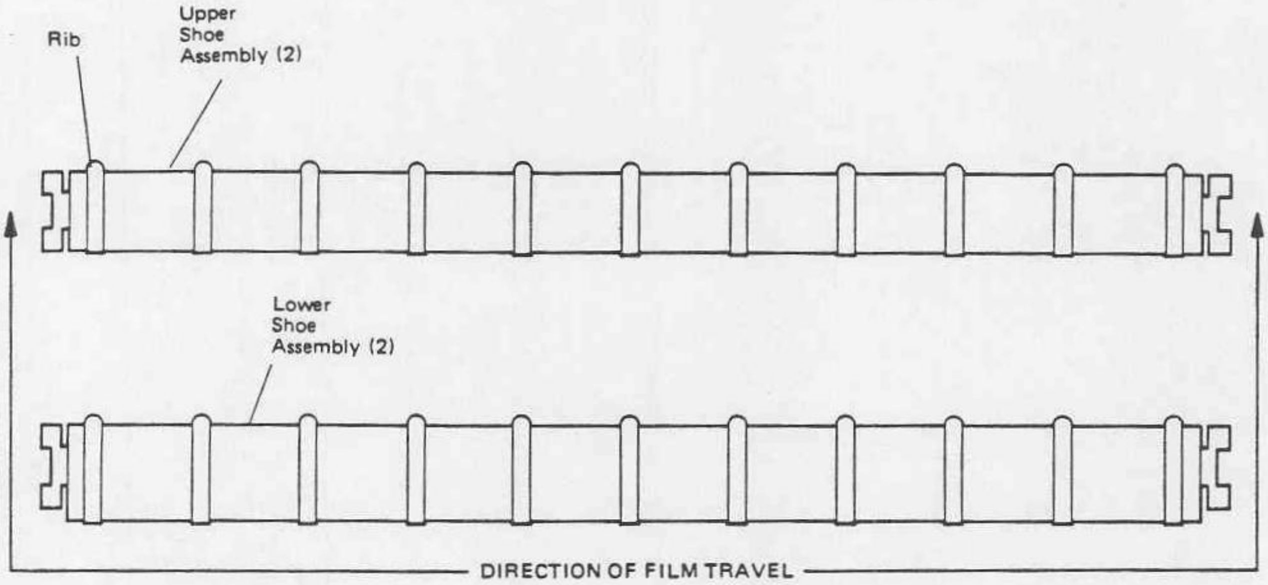

Rib
Upper Shoe Assembly (2)
Lower Shoe Assembly (2)
DIRECTION OF FILM TRAVEL

Figure 5-9. Shoe Assemblies

Rack Disassembly/ Reassembly

See ***Section 6, Parts,*** for exploded views of the racks and for part numbers.

When disassembling or reassembling the solution racks, observe the following general guidelines:

1. Work on one rack at a time. It will rest flat on a surface when placed on its side. Do not interchange the parts from one rack with those from another rack. The rollers are hollow and can collect chemical residue which will contaminate the solution in another tank.
2. Lay out any parts removed from the rack in the order in which they are removed, so that you can easily remember how to reassemble them. Note the exact position of each size roller and the rubber exit rollers in the assembly.
3. The shoe assemblies are always placed in the rack so that the ribs point in the direction of film travel (see Figure 5-9).
4. Replace tan phenolic and rubber rollers in the same locations from which they were removed.
5. Some racks have plastic inlets at the side of the racks, which permit solution to directly enter the racks. These plastic rack inlets are necessary for proper solution circulation.
6. The stainless steel pins on the moving plate will not fit into the roller cranks, paddle shaft crank(s), or pivot links, unless all cranks and links are placed in the down position before installing the moving plate.
7. After the rack has been reassembled, place the rack on a flat surface and check that it is square. Tighten any loose tie rod or shoe assembly screws.
8. Feed a 14 in. (35 cm) piece of previously exposed and processed film through the rack while turning the rack worm gear (main rack gear) by hand. Make certain the rack transports the film properly. If the rollers and gears do not turn without binding, eliminate the cause of the bind.

Squeegee Roller Adjustment

To minimize drying streaks or water marks on film, slightly increase the tension on the exit squeegee rollers. Do this by inserting film between the rollers, and tightening the set screws on the rack side plates with a 5/64 in. Allen wrench until the film just drags on the rollers as the film is removed (see Figure 5-10). Make certain the squeegee rollers are parallel after the adjustment has been made, and that excessive drag does not cause the rack to bind. After making the squeegee adjustment, manually turn the rack worm gear (main rack gear) by hand. Make certain the lower squeegee roller is being driven. If it is not, tighten the set screws.

Caution: Do not overtighten the set screws. Overtightening may bottom out the screws and bind the gears.

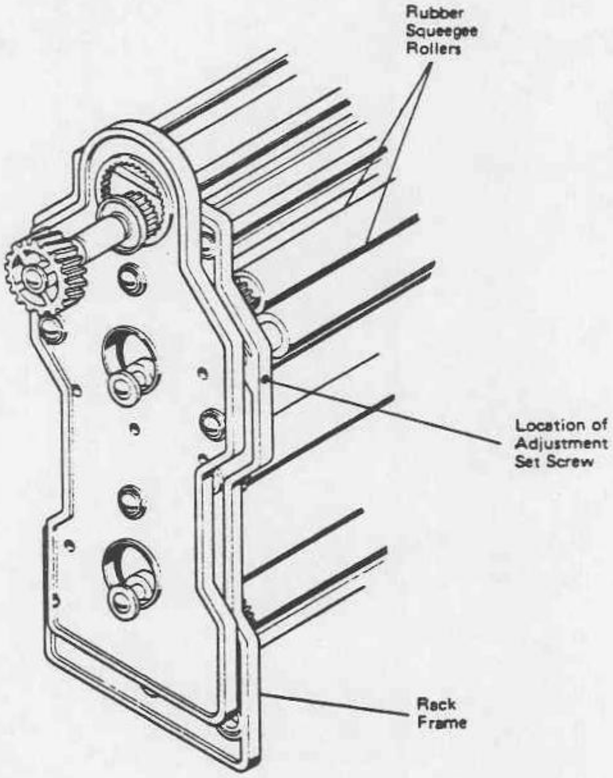


Figure 5-10, Squeegee Roller Adjustment

Splash Guard

The splash guard rests across the tops of the developer and fix solution racks (see Fig. 5-8), completely covering the developer/fix crossover assembly. The splash guard protects against solution contamination. To gain access to the splash guard, remove the top cover from the processor.

Remove the splash guard by lifting the guard straight up. When reinstalling the guard, position the word "FIX" on the splash guard directly over the fix rack.

Crossover Assemblies

The crossover assemblies fit between the developer and fix and between the fix and wash racks. They provide a smooth, curved surface (or shoe) which bends the film down into the fix rack (from the developer) and into the wash rack (from the fix).

If the film is to be transported properly through the processor, the developer and fix crossover assemblies must be installed correctly (see Figure 5-8). Make certain the crossover assemblies fit down on the upper tie rods of the solution racks and that the crossover shoes do not interfere with the operation of the solution rollers on either side of them.

Dryer Rack

The dryer rack rests on a support bearing and a support spacer, which fit into the frame of the processor (see Figure 5-8). The dryer rack must be seated into the processor frame if the rack is to transport the film properly.

Remove the dryer rack from the processor and turn the main gear by hand. Examine the dryer rack to see that all of the rollers are being driven and that the strippers and collars are all in place on the discharge rollers (stripping rollers). Replace worn gears, strippers, bearings, and springs.

Problem: No Drive

PREPARATION: Remove top cover, front cover, check fuses, and remove PC Board cage cover. Turn power on with solution in tanks.

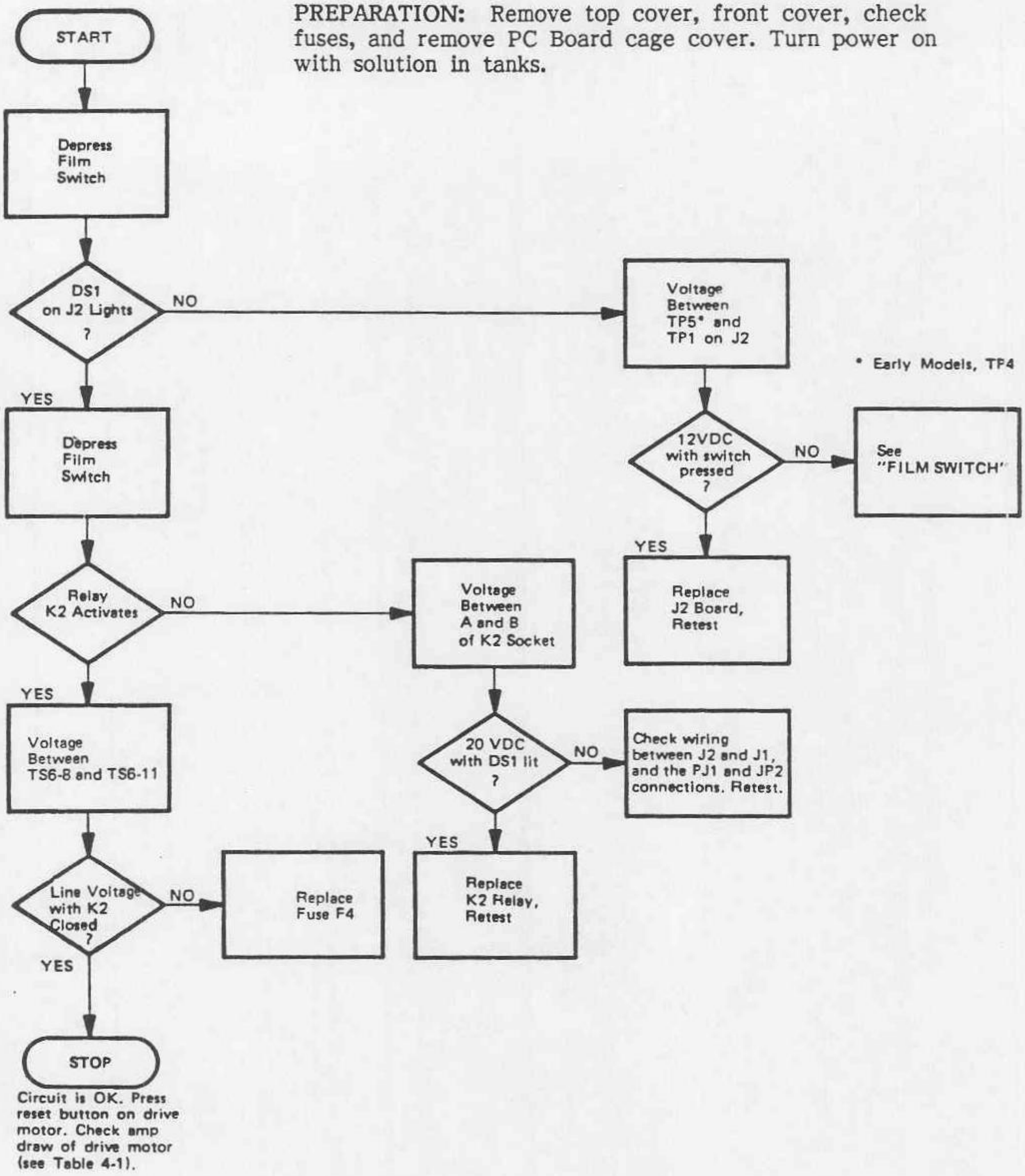

START
Depress Film Switch
DS1 on J2 Lights ?
NO
Voltage Between TP5* and TP1 on J2
* Early Models, TP4
12VDC with switch pressed ?
NO
See "FILM SWITCH"
YES
Replace J2 Board, Retest
YES
Depress Film Switch
Relay K2 Activates
NO
Voltage Between A and B of K2 Socket
20 VDC with DS1 lit ?
NO
Check wiring between J2 and J1, and the PJ1 and JP2 connections. Retest.
YES
Replace K2 Relay, Retest
YES
Voltage Between TS6-8 and TS6-11
Line Voltage with K2 Closed ?
NO
Replace Fuse F4
YES
STOP
Circuit is OK. Press reset button on drive motor. Check amp draw of drive motor (see Table 4-1).

Figure 5-11, Diagnostic Chart for Drive System Failure

Drive System Failure

If there is no film transport, check for mechanical problems such as stuck solution racks or rollers, or broken gears or drive chain. Use the diagnostic chart, Figure 5-11, to check the electrical circuit.

Drive Motor and Shaft

The drive motor is located on the right side of the processor, beneath the developer tank. It drives the entire transport system through a set of sprockets and drive chain and a main drive shaft. The horizontal worm gears on the main drive shaft mesh with the main rack gears of the developer, fix, wash and dryer racks. This drives the rollers in the racks to advance the film. Rollerless crossover assemblies between the developer/fix and fix/wash racks minimize crossover time. The speed at which the film is advanced through the racks is predetermined by the speed of the drive motor, the reducer gear ratio, and the size of the drive sprockets. The developer and dry-to-dry times are listed in the Technical Specifications section. The transport system on the ***AFP 14X-3*** operates whenever the power switch on the control panel is in the ON position.

The drive motor normally has enough torque to turn the drive shaft even if one of the racks is stuck. Motor failure would most likely occur from an internal short or bind.

Power to the drive motor can be checked at terminal strip TS6. There should be approximate line voltage between TS6-8 and TS6-11 when the motor is running.

Removing the Drive Motor

Refer to Figure 5-12.

1. Remove the front cover and right side panel.
2. Disconnect the motor wires at terminal strip TS6.
3. Remove the four nuts on the motor mounting plate.
4. Use an Allen wrench to loosen the set screw on the motor drive sprocket.

Drive System Failure, Continued

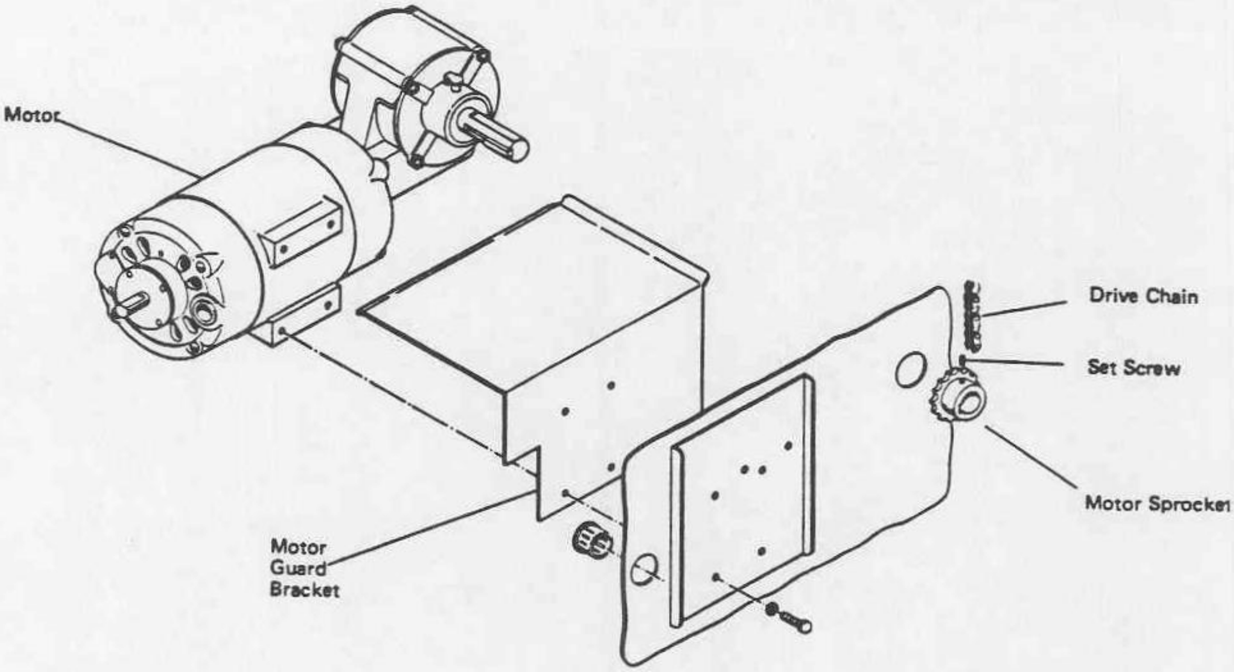


Figure 5-12, Drive Motor (Exploded View)

Drive Chain

The processor drive chain is located inside the electrical compartment. Remove the front panel and the chain guard to gain access to the drive chain.

WARNING: Disconnect the power supply to the processor before removing the front panel, as severe electrical shock will result from coming into contact with "live" electrical components.

The drive chain may require periodic adjustment to maintain the correct tension of the chain on the drive sprockets. Adjust the drive chain tension spool until the chain deflection (or play) is about 1/8 to 1/4 in. (0.3 to 0.6 cm), refer to Figure 5-13. Do not overtighten the chain, as this will cause excessive sprocket wear.

If drive chain removal is required (for example, when checking for a bind in the drive shaft), remove the connecting link from the drive chain, and then remove the drive chain from the sprockets.

Drive System Failure, Continued

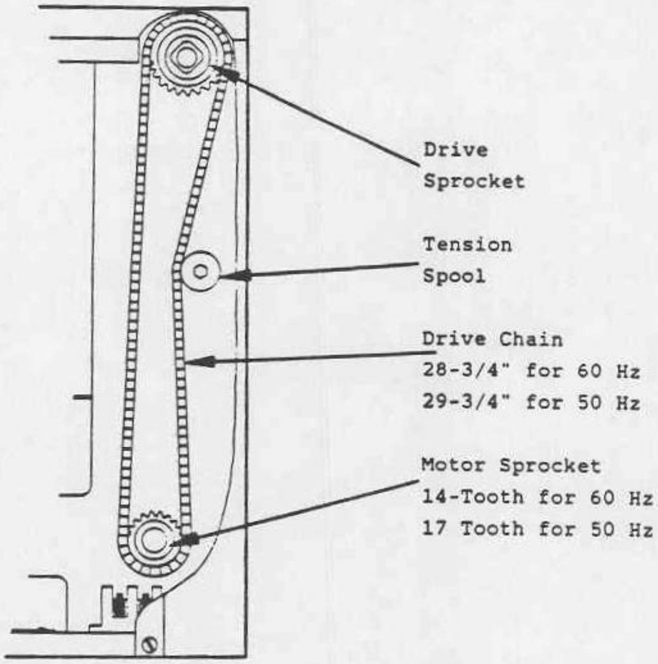

Drive
Sprocket
Tension
Spool
Drive Chain
28-3/4" for 60 Hz
29-3/4" for 50 Hz
Motor Sprocket
14-Tooth for 60 Hz
17 Tooth for 50 Hz

Figure 5-13, Drive Chain Adjustment

Drive Shaft

The plastic running gears on the drive shaft should be lubricated weekly with a moderate amount of AFP 8827 Grease (see Figure 5-14). A moderate amount of this same grease should be applied to the thrust bearing at the end of the main drive shaft every 6 months. Wipe off the old grease before adding the new.

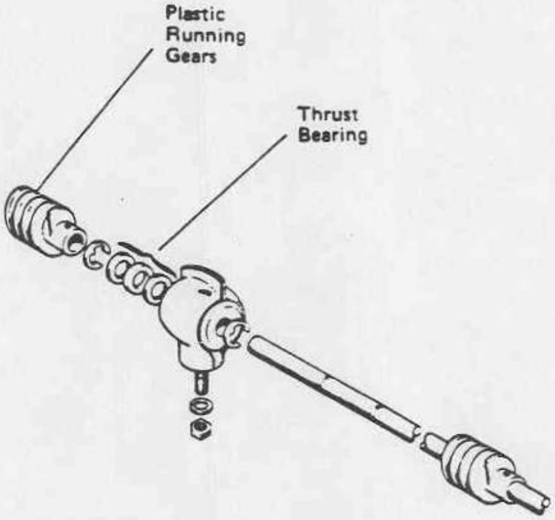

Plastic
Running
Gears
Thrust
Bearing

Figure 5-14, Drive Shaft

Circulation Problems

Separate pumps circulate developer and fix in the solution tanks. The pumps operate constantly when the power switch is ON. Pump circulation combines with the circulation induced by the transport rollers to give the proper amount of solution agitation at the film surface. The circulation system is shown schematically in Figure 5-15.

Figure 5-15, Schematic Diagram of Internal Plumbing

Circulation Problems, Continued

Wash water enters the wash tank at a rate of 3/4 gpm (2.8 liters per min) during film processing and during the jog cycle. A solenoid valve turns the water on and off (see Figure 5-16).

The level detector circuit automatically fills the developer tank and keeps it filled. Whenever the solution level falls below the level of the detector's probes at the top of the developer tank, the replenisher pump activates and adds replenisher to top off the tank.

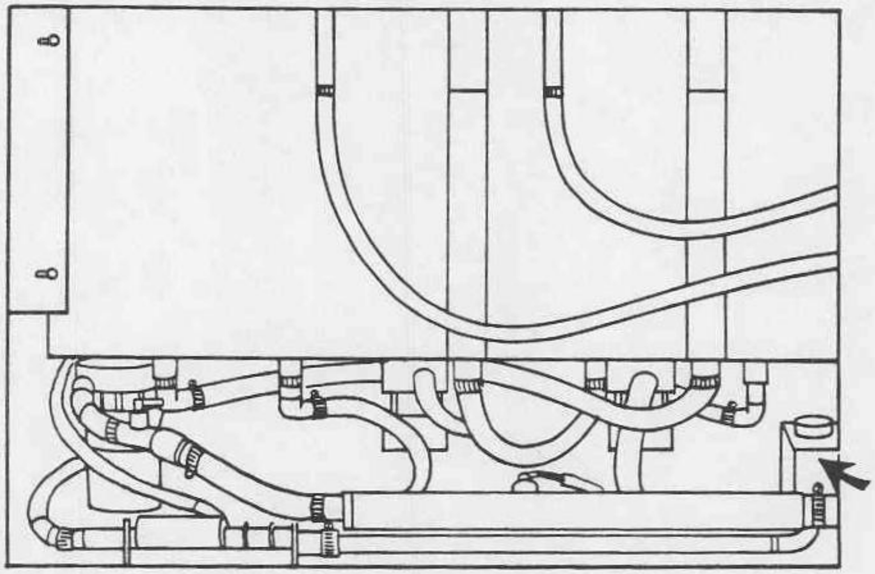


Figure 5-16, Wash Fill Solenoid Valve Location

Expended fix and developer solutions overflow into the drainports on the right side of the tanks and into the drain manifold. If the fix drainport becomes plugged, the solution will flow into a safety drainport (see Figure 5-17). The developer and fix tanks may be drained after the power has been turned off by opening the valves at the drain manifold on the drain lines from the circulation pump (see Figure 5-18).

The wash tank has an overflow weir at the rear of the tank for skimming action. The overflow flows either back to the wash recirculation reservoir or directly to the drain, depending on installation. When the machine is turned off, the drain solenoid opens and the wash tank drains directly into the drain manifold.

Circulation Problems, Continued

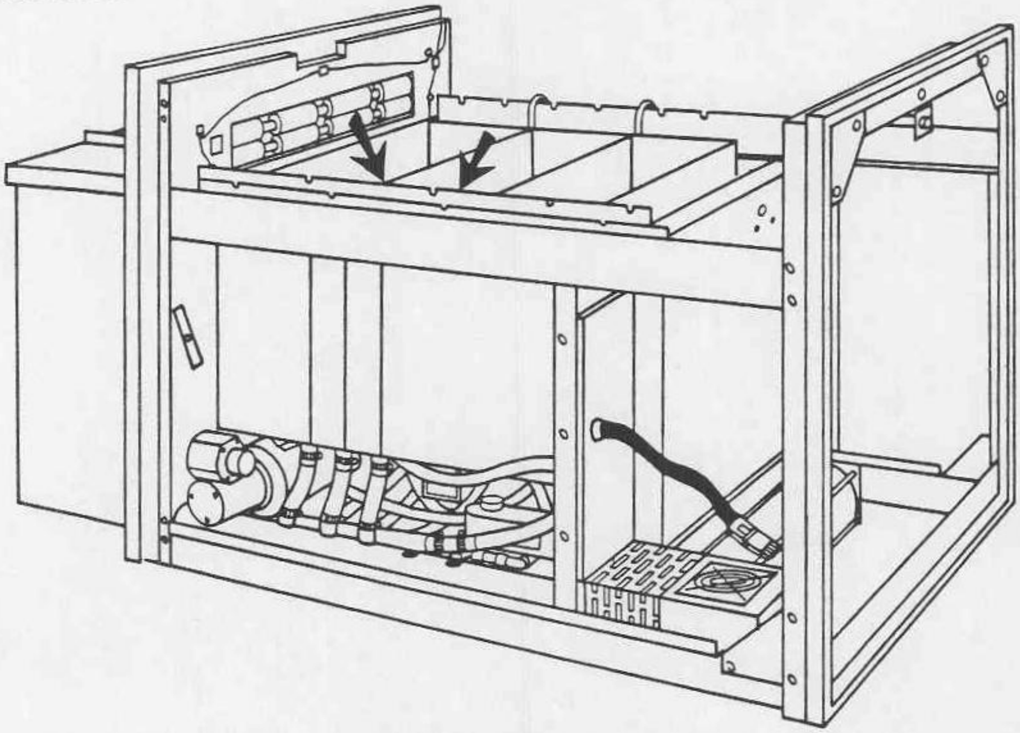


Figure 5-17, Dev and Fix Tank Overflow Ports

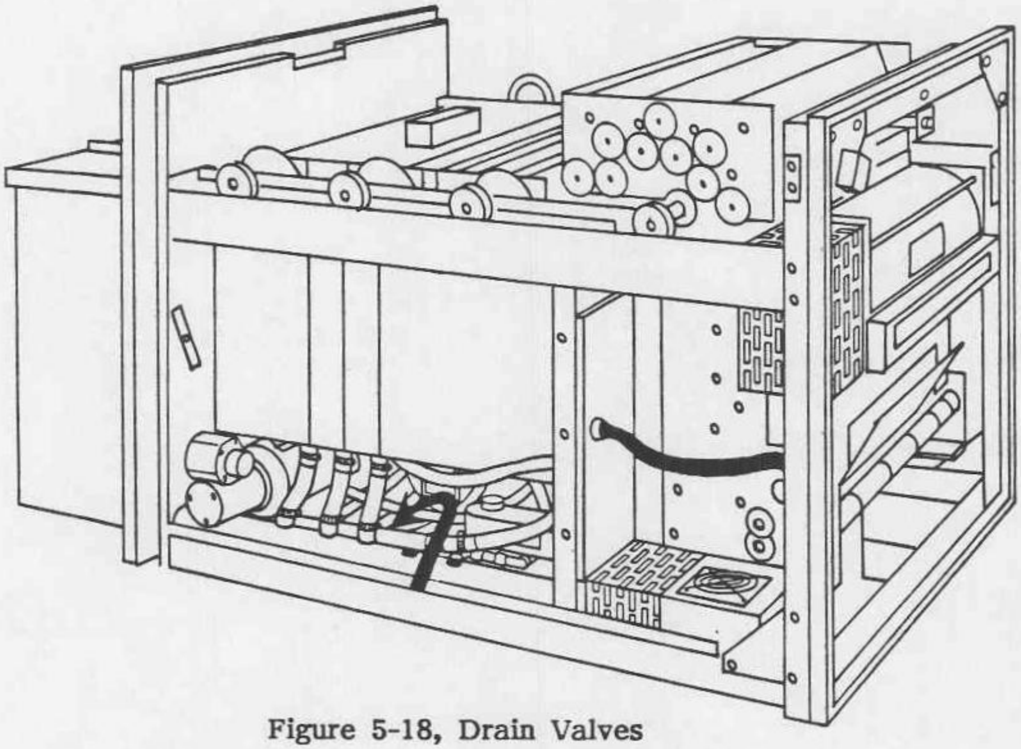


Figure 5-18, Drain Valves

Lack of Circulation

Poor solution circulation can contribute to a variety of problems associated with temperature control and film artifacts. Lack of proper circulation can be caused by the following:

1. Chemistry that is allowed to stagnate, causing deposits to form in tanks and lines
2. Lack of a regular routine of draining and flushing tanks and lines
3. Applying power when tanks are empty, causing the pumps to overheat, possibly damaging the impellers
4. Kinks or restrictions in the lines.

Draining & Flushing Tanks & Lines

Since the pumps and lines are below the tanks, they must be flushed whenever chemistry is changed. Proceed as follows:

1. Turn OFF the power switch. Remove the top cover and side panels.
2. Drain the developer and fix tanks by opening the valves on the drain manifold in the drain lines from the pump (see Figure 5-18).
3. Fill the developer and fix tanks with water up to the standpipe level.
4. Turn ON the power switch and let the processor run for a few minutes.
5. Turn OFF the power switch. Drain the tanks using the procedure given in step 2.
6. Make sure all connections are tight before adding new chemistry.

Lack of Circulation, Continued

Diagnosing Leaks

To discover the source of leakage from the tank area, remove a side panel and look for deposits or spotting under the tanks. If a leak is occurring around a fitting, drain the tank to a point below the level of the fitting. Remove the fitting and clean and inspect the seals. Replace the seals if they are damaged. Procedures for removing specific tank components appear in the applicable sections later in this manual.

Leaks at the hoses can usually be stopped by tightening the hose clamps. RTV sealant can be used to seal some leaks.

Be sure to clean up splashes below the tank. Inspect wiring and components to make sure there is no damage.

Circulation Pump Check

The developer and fix circulation pumps are identical. The motors are lubricated for life. The pump impellers are magnetically driven and are not directly attached to the pump motor drive shafts. If a pump motor is operating, but solution is not circulating, check for a stuck impeller. If the pumps are run when dry, the impellers and plastic pump housings will be damaged by excessive heat, causing the impeller to jam.

A stuck impeller could also be caused by a foreign object wedged between one of the impeller blades and the housing. To check for a stuck impeller, drain the solution tank and remove and disassemble the pump. Remove any foreign material and check for damage. When re-assembling the pump, make certain all the O-rings are in place between the pump and the mounting flange on the tank. (see Figure 5-19).

Power to the pumps is supplied through the power switch and terminal strip TS6. Check for approximate line voltage between TS6-18 and TS6-20 (developer pump) and TS6-17 and TS6-21 (fix pump), with the power switch ON and solution in the tanks.

Lack of Circulation, Continued

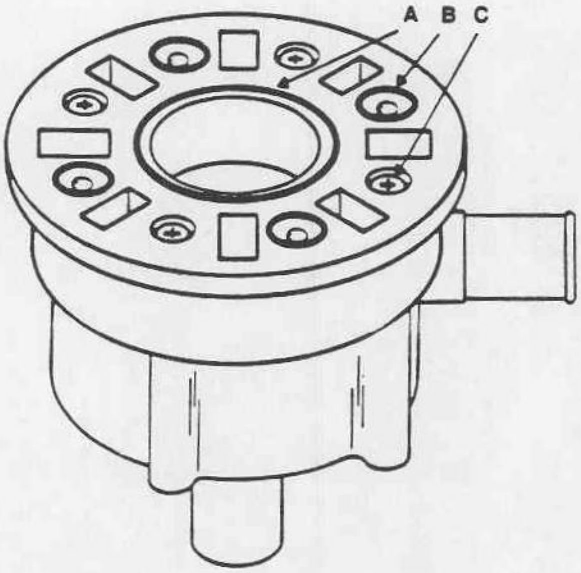


Figure 5-19, View of Circulation Pump Head

Servicing Circulation Pumps

The developer and fixer circulation pumps are easily removed for cleaning and/or servicing.

Removal

1. Unplug the processor from its power outlet.
2. Drain and thoroughly rinse the tank from which the pump is to be removed.
3. Disconnect the pump power cable from the terminal strip.
4. Disconnect all hose connections from the pump body.
5. Remove the drain filter disk from the bottom of the processing tank to expose the four pump mounting screws.
6. Carefully remove the four screws and lower the pump.

NOTE: There are five "O" rings between the bottom of the tank and the mounting surface of the pump, see Figure 5-19, Items A & B. Be sure to locate and save all 5 "O" rings when removing the pump.

Lack of Circulation, Continued

Disassembly & Cleaning

Developer recirculation pumps are usually cleaned adequately by systems cleaning and seldom require disassembly.

Fix pumps should be disassembled for cleaning at least once a year to remove hardened residue build up.

Disassemble and clean as follows:

1. Remove the four pump head assembly screws, Figure 5-19, Item C.
2. Gently separate the pump head assembly. Locate and save the internal "O" ring seal inside the pump head.
3. Remove the impeller from the pump head and thoroughly clean all pump head parts in warm water.

Assembly

1. Reassemble the pump in reverse order, lubricate the internal "O" ring with a silicone base lubricant before installing. Do not over tighten the self-tapping assembly screws.

Installation

1. Carefully install the pump in reverse order of removal. Lubricate the 5 "O" rings that seal the pump to the tank base with a silicone base lubricant before installing.
2. Test the pump for operation with water before installing chemistry.

Wash Tank Problems

The wash tank will drain automatically when the power switch is turned OFF. The top cover should be left slightly ajar to allow the tank to dry out. Failure to do this will cause dirt accumulation in the tank and possible algae growth. Dirt will be transferred to film as it passes through the tank.

Incoming water that contains significant impurities will also cause streaks or spots on film. Filtering the incoming water supply will help eliminate this problem.

When power is first applied to the processor, the drive system and water solenoid activate for 4-1/2 min. Additional water will enter the tank while the processor is in the jog cycle during the warm-up period. If the wash tank is not filled by the time the first film passes through it, check for a restriction in the incoming line, such as a dirty water filter or a shutoff valve not completely open.

Wash Fill Solenoid & Flow Restrictor

A flow restrictor and water solenoid regulate the flow of water to the wash tank (see Figure 5-20). The solenoid activates whenever the drive motor is on. Water flows from the water inlet through the flow restrictor, which reduces the flow rate to 3/4 gpm (2.8 liters per min).

Water then flows through the solenoid valve and into the wash tank.

Check the operation of the water fill solenoid by turning ON the power switch. The solenoid valve should click on, and water should flow into the wash tank. When the transport system turns off, water should stop flowing.

The solenoid valve is located just behind the electrical panel, on the left side of the processor. Power is supplied to it through relay K2. Check for approximate line voltage between TS6-7 and TS6-12 when the transport system is activated. If there is proper voltage but the valve does not operate, the coil may need to be replaced, or the valve may be stuck.

Wash Tank Problems, Continued

To remove and inspect the solenoid valve:

1. Turn off power. Turn off and disconnect the external water supply.
2. Disconnect the wiring, including the ground wire.
3. Unscrew the flow restrictor from the front.
4. There are two screws holding the valve, located on both sides of the water inlet. Remove them and bring the solenoid out the left side of the machine.
5. Remove the red plastic cap. Pull the valve down and out of the coil.
6. Remove the valve operator by turning the hex fitting counterclockwise.
7. Check the action of the spring. Remove any foreign material from inside the valve. Check the valve seat for possible corrosion or damage. If damage is found, replace the valve.

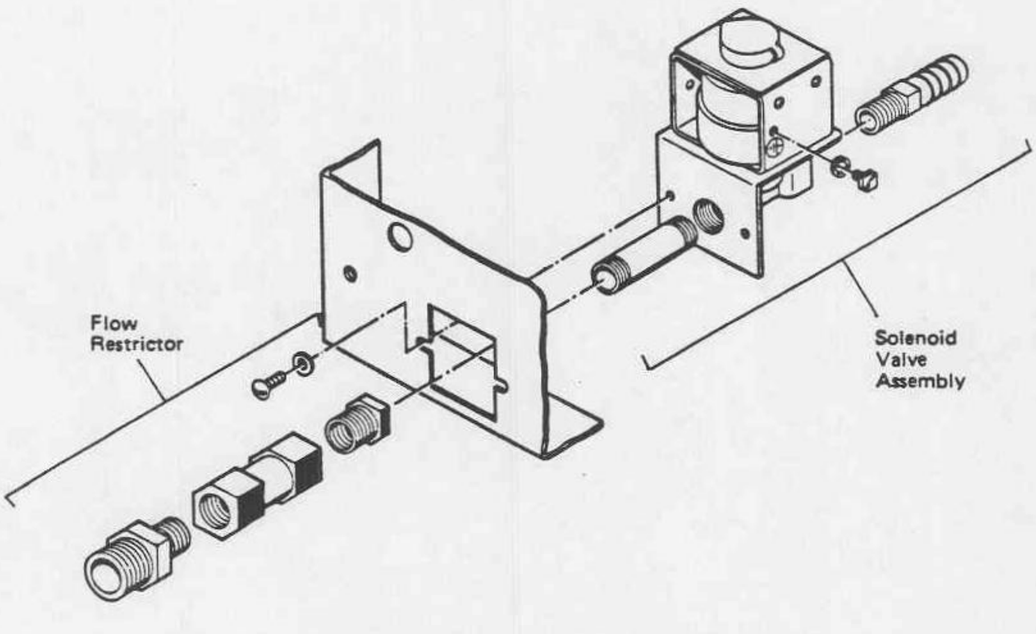


Figure 5-20, Water Solenoid and Flow Restrictor (Exploded View)

Wash Drain Solenoid

When power is applied to the processor, the wash drain solenoid closes. When power is turned off, it opens, allowing the water to flow into the drain manifold.

The wash drain solenoid valve is located beneath the wash tank, on the right side of the processor (see Figure 5-21). Check the operation of the solenoid by turning ON the power switch. The fill solenoid will open and the drain solenoid will close. Check for line voltage between TS3-8 and TS3-6. Shut off the power and check if the solenoid opens and the water drains. If voltage is correct but the valve does not operate, the valve may be stuck or the coil may be defective.

To remove and inspect the solenoid valve:

1. Remove the red plastic cap, data plate, and green cover from the solenoid.
2. Remove the two coil wires from terminal strip TS3. Mark the terminals so that the wires will be reattached to the correct terminals. Remove the coil from the valve.
3. Remove the green ground wire from the terminal strip on the processor. Note which terminal the wire was removed from.
4. Remove the valve operator by turning the hex fitting counterclockwise.
5. Check the spring action, and remove any foreign material from the inside of the valve.
6. Check the valve seat for possible corrosion or damage. Replace the valve, if damaged.

Algae Control

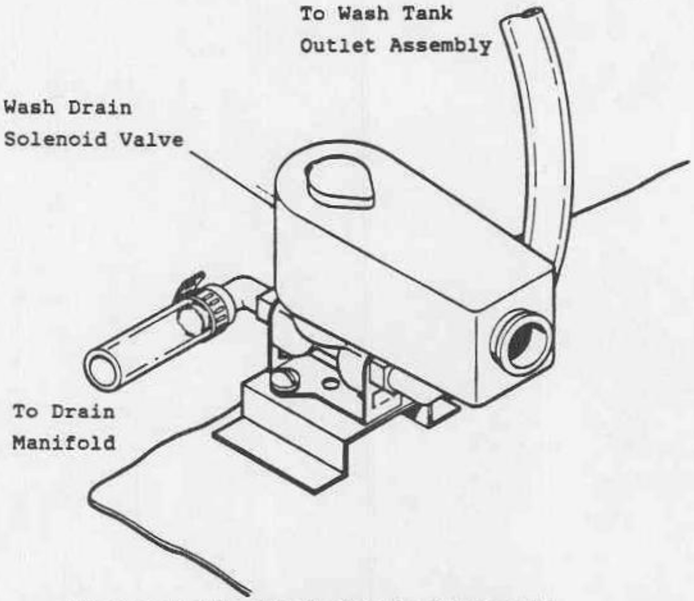


Figure 5-21, Wash Drain Solenoid

Use the following methods to control algae (Bacterial Slime) growth:

1. Drain the wash tank by shutting off the machine. If the tank dries slowly after it drains, algae that exists can form spores which will seed new algae as soon as water is added. To speed drying, leave the top cover ajar when the wash tank is drained.
2. Use filtered cold water for wash.
3. Rinse and scrub all surfaces regularly.

If algae is not controlled by the above methods, rinse the wash tank for 1/2 hour weekly, using the following procedure:

1. Drain the wash tank and remove the rack.
2. Fill the tank with fresh water and 1/2 oz. (15 cc) sodium hypochlorite (household bleach). Note that the machine will have to be turned on to keep the automatic wash drain closed.
3. Wait for 1/2 hour, then drain and rinse the tank.

NOTE: If severe algae (Bacterial Slime) build-up exists, follow the same procedure, but use 2 oz. (60cc) bleach in the tank.

Replenishment Problems

The replenishment system operates in two switch-selectable modes. The mode switch is switch S1 on the timing PC board J2 (see Figure 5-22). In the high volume mode, replenishment occurs while the film switch is depressed by film being fed into the machine. In the low volume mode, replenishment occurs not only when the film switch is depressed, but also whenever there is a jog cycle. This mode is intended to prevent stagnation of chemistry from a lack of use.

In both modes, replenishment occurs if the developer solution falls below the level probes, and for 30 sec after the solution is up to probe level.

To check for proper operation in the high volume mode, press the film switch and observe the pump. Also observe LED DS3 on the J2 PC board, which is the pump run signal. The pump should run when the switch is pressed, and stop when the switch is released.

In the low volume mode, check that the pump run during the jog cycle (9 sec every 3 min), as well as when the film switch is depressed. If DS3 lights but the pump does not run, the problem is probably in fuse F2, relay K1 or the pump.

Replenishment System Failure

If there is no replenishment, check for empty storage tanks, air in the lines, or a leaky pump that sucks air. Then use the Diagnostic Chart, Figure 5-23.

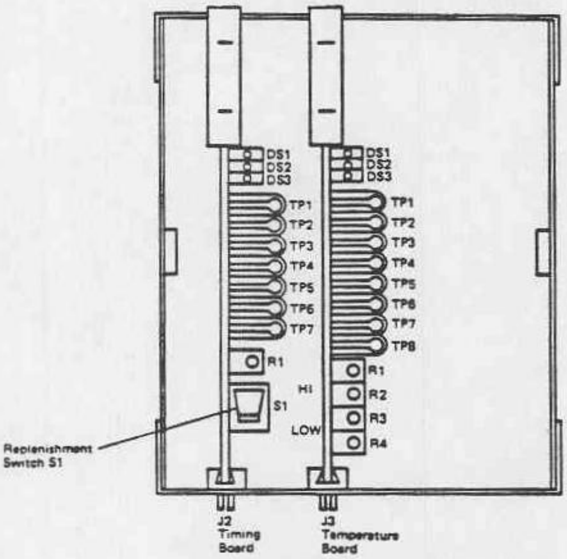

DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
R1
HI
S1
LOW
DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
R1
R2
R3
R4
Replenishment Switch S1
J2 Timing Board
J3 Temperature Board

Figure 5-22, PC Boards

Problem: No Replenishment

PREPARATION: Check the storage tanks for solution. Check the lines for restrictions, deposits, or air gaps. Remove the top & front cover. Check the fuses. Remove the card cage cover. Turn power on.

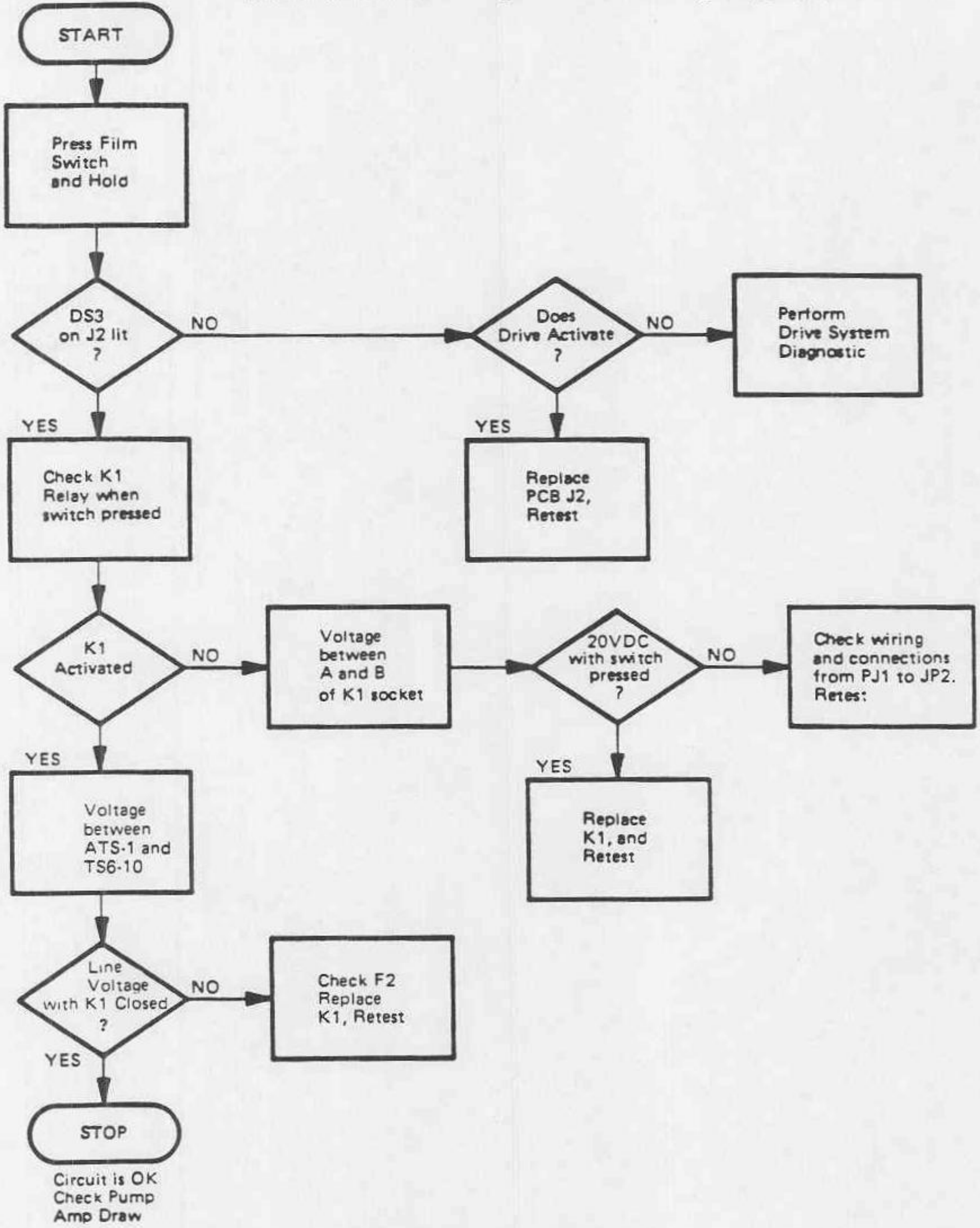

START
Press Film Switch and Hold
DS3 on J2 lit ?
NO
Does Drive Activate ?
NO
Perform Drive System Diagnostic
YES
YES
Check K1 Relay when switch pressed
Replace PCB J2, Retest
K1 Activated
NO
Voltage between A and B of K1 socket
20VDC with switch pressed ?
NO
Check wiring and connections from PJ1 to JP2. Retest
YES
YES
Voltage between ATS-1 and TS6-10
Replace K1, and Retest
Line Voltage with K1 Closed ?
NO
Check F2 Replace K1, Retest
YES
STOP
Circuit is OK Check Pump Amp Draw

Figure 5-23, Diagnostic Chart for Replenishment System Failure

Replenishment, Continued

NOTE: Circled numbers are wire node numbers. Triangles are test points or LEDs. Pin numbers or letters appear at card edges.

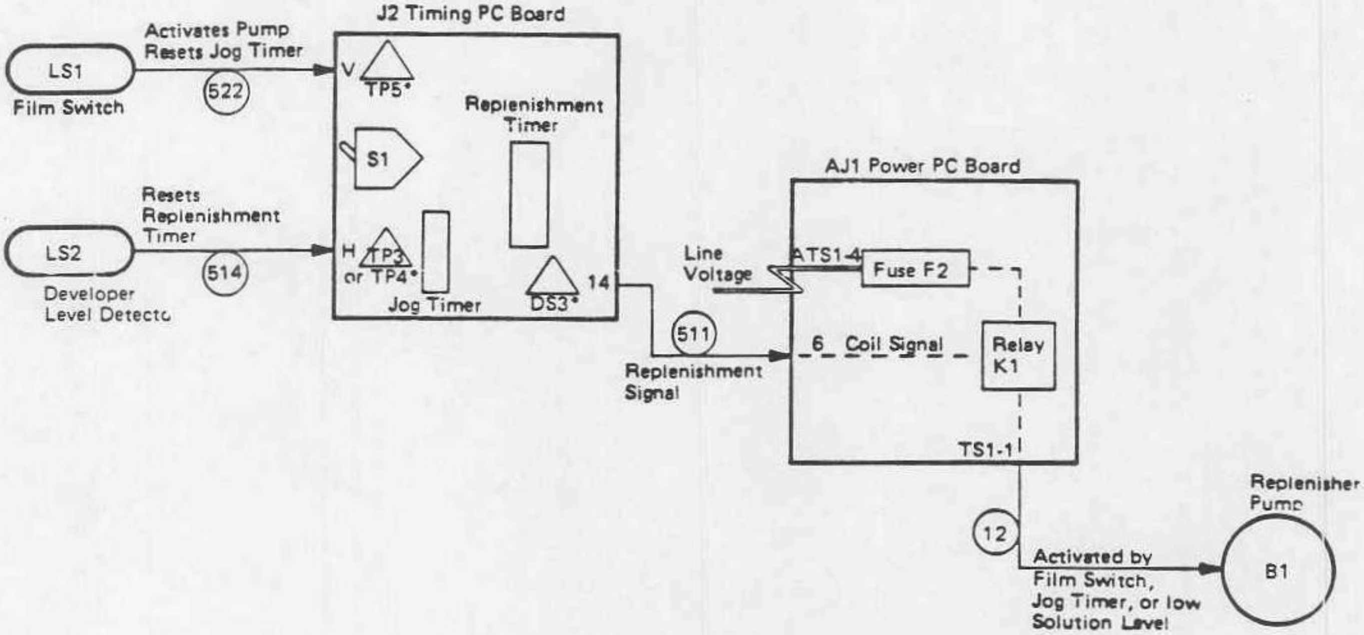

J2 Timing PC Board
LS1
Film Switch
Activates Pump
Resets Jog Timer
522
V
TP5*
S1
Replenishment Timer
LS2
Developer Level Detecto
Resets Replenishment Timer
514
H
TP3
or TP4*
Jog Timer
DS3*
14
AJ1 Power PC Board
Line Voltage
ATS1-4
Fuse F2
511
6 Coil Signal
Relay K1
Replenishment Signal
TS1-1
12
Replenisher Pump
B1
Activated by Film Switch, Jog Timer, or low Solution Level

Figure 5-24, Signal Flow Diagram of Replenishment Circuit

Replenisher Pump(s)

The developer and fix pump bellows have poppet valves and O-rings that can cause problems if they are not seating properly or are dirty (see Figure 5-25). Visually check that they are functioning properly. The poppet valves should be positioned so that their stems point against the direction of replenisher flow.

If the pump is not delivering enough replenisher, check the hoses and connections for air leaks. Make sure the connections are airtight. Increase the pump volume by adjusting the stroke on the pump to bleed the lines. If the pump seals are not sealing even when wetted, replace them.

Power to the pump is supplied through relay K1, fuse F2, and terminal strips ATS1 and TS6. Check for line voltage between ATS1-1 and TS6-10 with the film switch depressed.

Replenishment, Continued

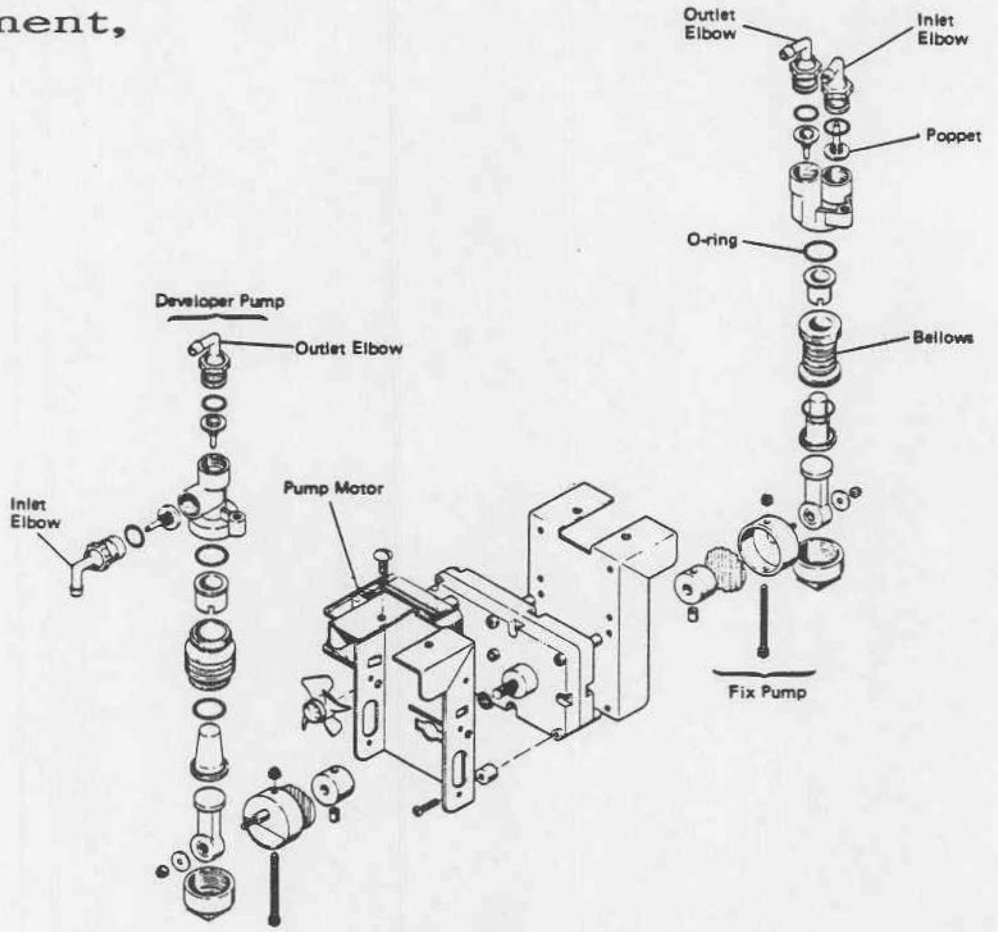

Outlet Elbow
Inlet Elbow
Poppet
O-ring
Bellows
Developer Pump
Outlet Elbow
Pump Motor
Inlet Elbow
Fix Pump

Figure 5-25, Replenishment Pump(s)

Replenishment Calibration

Calibrate the pump so that the total amount of replenisher pumped while the sensor fingers are depressed by a sheet of film is equal to the amount of replenisher needed for that sheet of film.

1. Bleed air from the replenisher lines. Check that the pump is pumping adequately.

2. Take the standard size sheet of film that the customer will run and determine the amount of replenishment required, based on the film manufacturer's recommendations. Since the developer and fix replenisher pump heads can be adjusted independently, different rates for developer and fix can be used.

3. Remove the developer replenisher gooseneck from the left side of the developer tank and place it in a graduated cylinder of sufficient capacity.

Replenishment, Continued

4. Run the standard size sheet of film through the processor and collect the developer replenisher in the cylinder.

5. If the amount of replenisher does not correspond with the sensitized materials manufacturer's recommended rate, adjust the stroke of the pump.

   a. To adjust the rate of replenishment, turn the volume screw on the replenisher pump clockwise to increase the rate, and counterclockwise to decrease the rate. Do not touch the locknut.

   b. Continue to adjust the volume screw and measure the replenisher delivered into the beaker until the amount delivered matches the recommended rate.

6. Run the film through the processor again, collecting the entire quantity pumped for the film. If necessary readjust the pump stroke to obtain the desired quantity.

7. Calibrate the fix pump head in the same way.

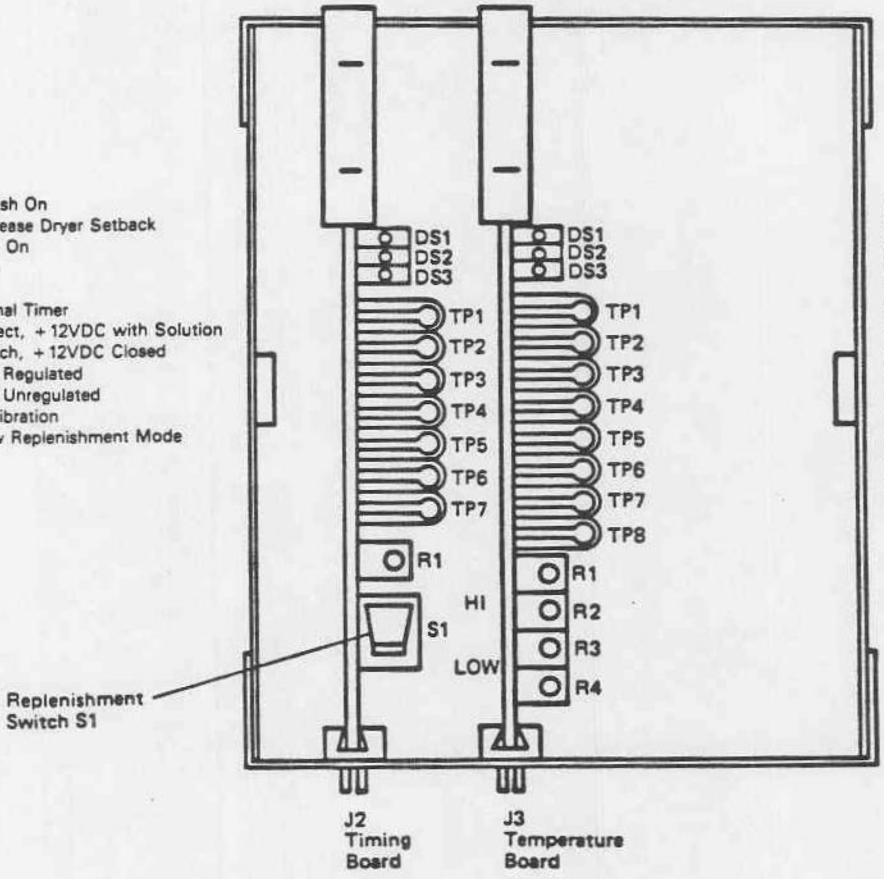
Temperature Problems

Developer and fix are heated by a single 1500 watt heater located in a tube under the developer and fix tanks on the left side of the processor.

The dryer has two 750 watt coil heaters which heat air which is directed to the film surfaces by blowers and air ducts.

Both the developer and dryer heaters are controlled in the same way. The desired temperature is set on the temperature control dials inside the front panel cover.

Temperature probes in the bottom of the developer tank and in the dryer air duct feed back the actual temperature. A temperature controller signals two triac switches, one for the developer heater and one for the two dryer heaters. The triacs switch line voltage to the heaters.


DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
R1
S1
HI
LOW
Replenishment Switch S1
DS1
DS2
DS3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
R1
R2
R3
R4
J2 Timing Board
J3 Temperature Board

DS1	Drive/Wash On
DS2	Run - Release Dryer Setback
DS3	Replenish On
TP1	Common
TP2	Clock
TP3	Feed Signal Timer
TP4	Level detect, +12VDC with Solution
TP5	Film Switch, +12VDC Closed
TP6	+12VDC Regulated
TP7	+20VDC Unregulated
R1	Clock Calibration
S1	High/Low Replenishment Mode

DS1	Developer Heater On
DS2	Dryer Heater On
DS3	Temperatures Ready
TP1	Common
TP2	Dryer Ramp, +4 to 6VDC
TP3	Developer Sensor
TP4	Developer Sensor Ramp (On-Off)
TP5	Dryer Sensor
TP6	Dryer Sensor Ramp (On-Off)
TP7	Developer Ramp, +4 to 6VDC
TP8	+12VDC Regulated
R1	Developer Bandwidth
R2	Dryer Bandwidth
R3	Dryer Scale Offset
R4	Developer Scale Offset

Figure 5-26, Adjustment and Test Points on PC Boards

Temperature Problems, Continued

The temperature PC board J3 is a proportional controller that allows full power to only one heating element at a time (see Figure 5-26). For warm-up, when power is first turned on, the controller switches full power to the developer heater only. You can check this by observing the LEDs on PC board J3, which will indicate when a heat signal is being sent to a triac. DS1 indicates developer heat, DS2 indicates dryer heat.

When the temperature of the developer is within 1 deg. F (0.6 deg C) of the dial setting, the controller will begin switching power to the dryer. The dryer blower turns on and DS2 on PC board J3 will begin blinking. DS1 and DS2 will alternately blink, indicating that the developer is close to the set point temp. and the dryer is being brought up to the set point temp.

When DS3 lights, both the developer and dryer have reached the temperature band. The dryer temperature at this point is automatically set back from the set point temperature. The temperature controller will maintain proper temperatures by alternately switching power to the heaters. You will observe DS1 and DS2 blinking at a 50:50 ratio or less when there is no film in the processor.

When film is loaded into the processor, more heat is made available to the dryer to bring it to set point temperature. LEDs DS1 and DS2 will show a proportion of up to 20:80 for the first sheet of film, which will vary depending on the operating load. More heat is made available to the dryer by a setback circuit. The circuit runs from a signal on J2 (DS2 lights), which is activated by the film switch. The setback circuit has the effect of increasing the dryer temperature dial setting by changing the resistance of the dial and temperature probe input to the temperature controller.

Heating System Failure

The flow chart in Figure 5-27 gives a procedure for checking a no heat condition. Other heating problems should be diagnosed in the same way. The LEDs on PC board J3 indicate whether or not the controller circuit is functioning. If these LEDs are working, the problem is probably not in the PC board. The components in the entire electrical circuit are shown in Figure 5-28.

Problem: No Warm-Up or Heat

Preparation: Remove front panel. Remove card cage cover. Check temperature dial settings, Check fuses, With solution in tanks turn power ON.

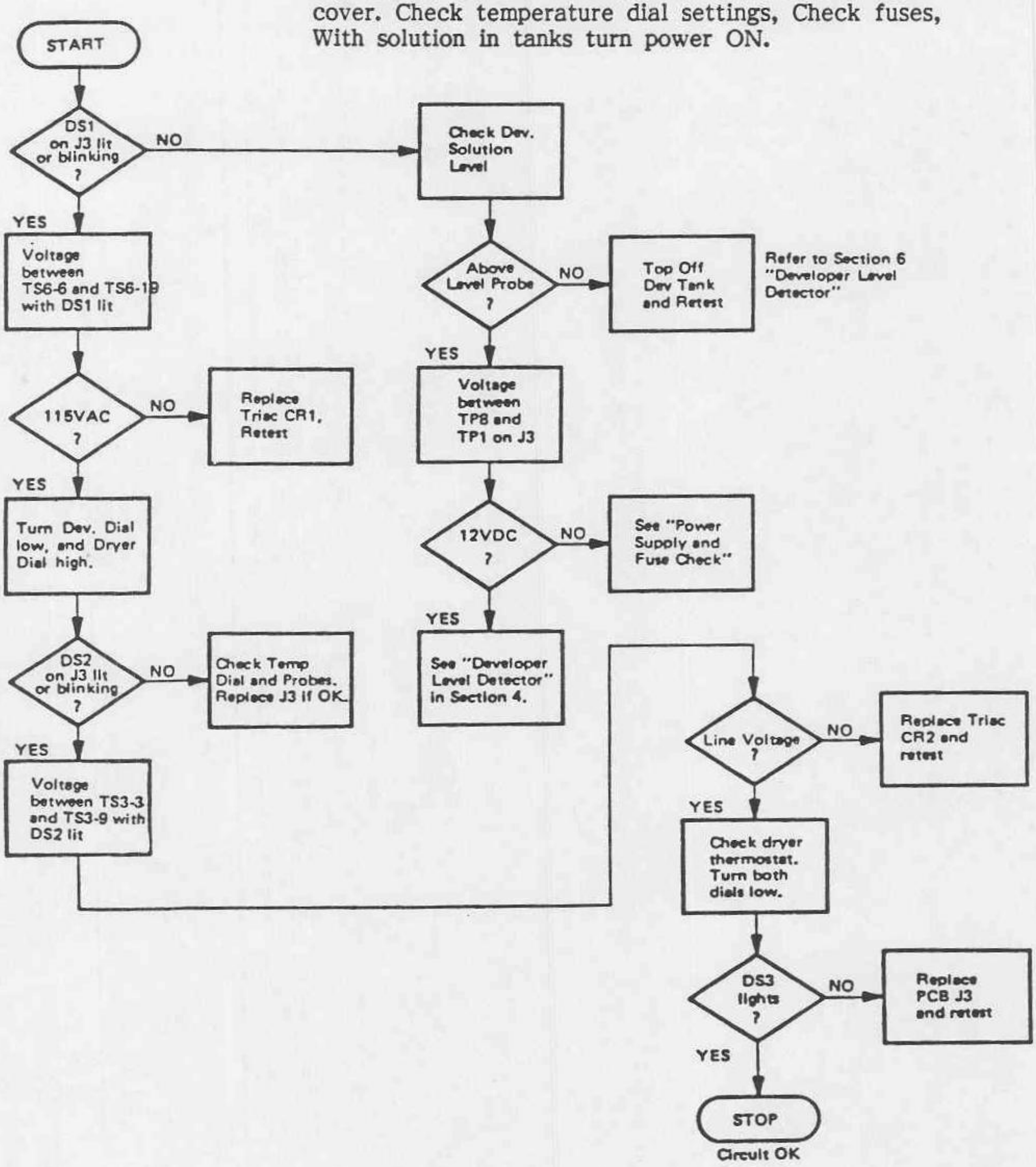
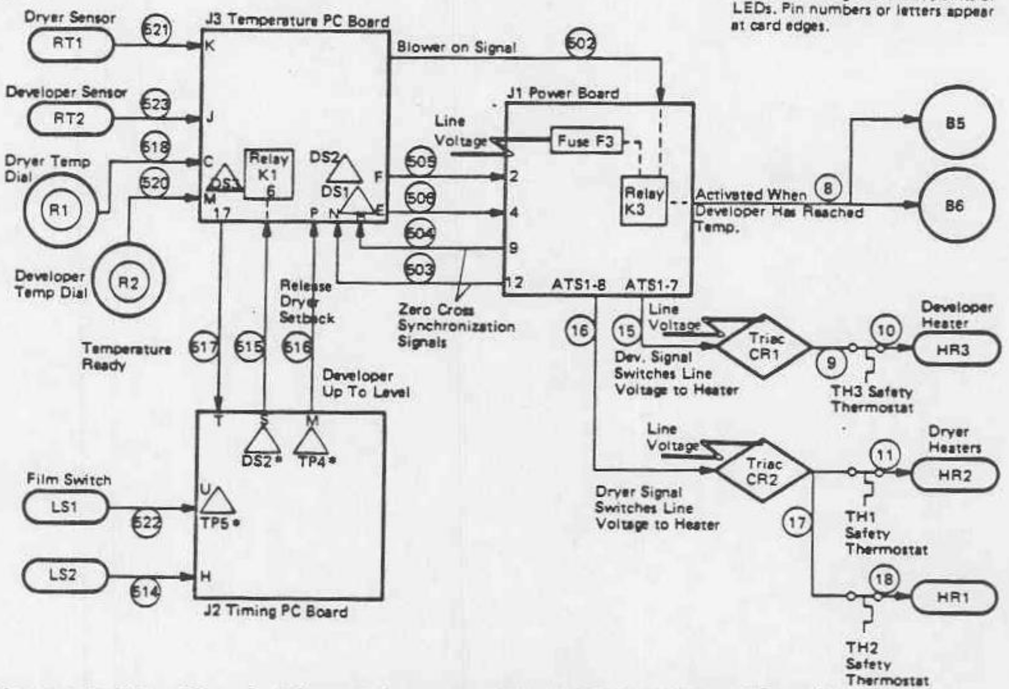

START
DS1 on J3 lit or blinking ?
NO
YES
Voltage between TS6-6 and TS6-19 with DS1 lit
115VAC ?
NO
Replace Triac CR1, Retest
YES
Turn Dev. Dial low, and Dryer Dial high.
DS2 on J3 lit or blinking ?
NO
Check Temp Dial and Probes. Replace J3 if OK.
YES
Voltage between TS3-3 and TS3-9 with DS2 lit
Check Dev. Solution Level
Above Level Probe ?
NO
Top Off Dev Tank and Retest
Refer to Section 6 "Developer Level Detector"
YES
Voltage between TP8 and TP1 on J3
12VDC ?
NO
See "Power Supply and Fuse Check"
YES
See "Developer Level Detector" in Section 4.
Line Voltage ?
NO
Replace Triac CR2 and retest
YES
Check dryer thermostat. Turn both dials low.
DS3 lights ?
NO
Replace PCB J3 and retest
YES
STOP
Circuit OK

Figure 5-27, Flow Chart for Checking a No Heat Condition

Temperature Problems, Continued



Note: On units S/N X3-929 and up the K- 3 relay has been eliminated. The effect is to power the blowers immediately at machine turn on.

NOTE: Circled numbers are wire node numbers. Triangles are test points or LEDs. Pin numbers or letters appear at card edges.

Dryer Sensor
RT1
521
J3 Temperature PC Board
K
Blower on Signal
502
Developer Sensor
RT2
523
J
518
Dryer Temp Dial
C
R1
520
M
Relay K1
6
DS3
DS2
DS1
F
E
17
P
N
Developer Temp Dial
R2
J1 Power Board
Line Voltage
Fuse F3
505
2
506
4
504
9
503
12
Relay K3
Activated When Developer Has Reached Temp.
8
B5
B6
ATS1-8
ATS1-7
Release Dryer Setback
Zero Cross Synchronization Signals
Temperature Ready
517
515
516
Developer Up To Level
16
15
Line Voltage
Triac CR1
Dev. Signal Switches Line Voltage to Heater
9
10
Developer Heater
HR3
TH3 Safety Thermostat
T
S
M
DS2*
TP4*
Film Switch
LS1
522
U
TP5*
LS2
514
H
J2 Timing PC Board
Line Voltage
Triac CR2
Dryer Signal Switches Line Voltage to Heater
11
Dryer Heaters
HR2
17
TH1 Safety Thermostat
18
HR1
TH2 Safety Thermostat

Figure 5-28, Signal Flow Diagram for Temperature Circuit

A quick way to check if the PC board is working is to turn up one temperature dial and turn down the other. You should see DS1 or DS2 light. If neither of the LEDs light, perform the "Power Supply and Fuse Check" on Page 5-8. Replace PC board J3 if the power supply is good. Perform the "Temperature Calibration" in this section after installing a new PC board.

Constant heat or erratic temperature control are caused by certain component failures. Constant heat, as evidenced by high developer activity or high evaporation of developer, most often is caused by shorting, which causes constant power to the heating element.

Since the developer heater has a safety thermostat, a shorted triac may cause overheating, then cut off until the element cools down, then cause overheating again. This would show as erratic temperature control. A shorted dryer heater triac will cause overheating, which will trip the dryer thermostat. If the thermostat trips again after the reset button is pushed, chances are it is due to a shorted triac. Erratic temperature control can also be caused by a faulty temperature probe.

Developer Heater Check

Power to the developer heater can be checked at terminal strip TS6. Turn OFF the power switch and turn up the developer temperature dial. Turn the power switch ON again, so that DS1 on PC board J3 lights. Check for line voltage between TS6-6 and TS6-19 when DS1 is lit. Turn down the temperature dial and check there there is no voltage when DS1 is not lit. If there is voltage at TS6 when DS1 is not lit, then triac CR1 is shorted and must be replaced.

Developer Safety Thermostat

The developer heater has a safety thermostat (TH3) that automatically resets after it cools down (see Figure 5-29). The cutoff point is approximately 130 deg. F (55 deg. D). Fluctuating developer temperature can be caused by a shorted triac causing the heater to heat up, cut off and cool down, and then heat up again. The voltage between TS6-6 and TS6-19 is line voltage. If there is no voltage on a hot heater, thermostat TS3 may have cut out. Wait for it to cool off, and recheck the voltage.

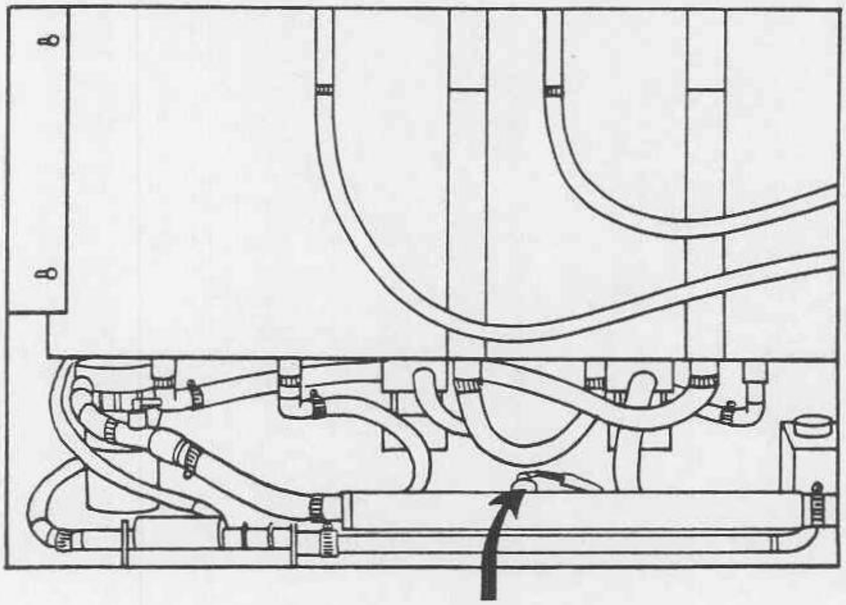


Figure 5-29, Location of Developer Heater Safety Thermostat

Developer Heater Check, Continued

Resistance of the immersion heater varies with temperature. A good heater has less than 25 ohms resistance between the two hot leads when they are disconnected from TS6. Check for infinite resistance between either hot lead and the green ground lead of the heater.

NOTE: Make sure the leads are isolated from the machine, and your hands are not touching the machine when checking resistance to ground.

Developer Heater Removal

1. Drain the tank. Place a cloth below the open end of the heat tube to soak up spilled developer. Disconnect power to the machine. Remove the front and left side covers.
2. Disconnect the heater wires from terminal strip TS6. Unthread the wiring.
3. Use a wrench to unscrew the heating element from the heat tube.
4. Reverse this procedure to install a heater.

Dryer Heater Check

Power to the dryer heaters can be checked at TS3, located on the right side of the dryer assembly (see Figure 5-30). Turn the dryer temperature dial up and the developer temperature dial down. Press the film switch to activate full power to the dryer. LED DS2 on PC board J3 should light. Check for line voltage between TS3-3 and TS3-9 when DS2 is lit.

Turn down the dryer temperature dial, and check that there is no voltage when DS2 is not lit. If there is voltage between TS3-3 and TS3-9 when DS2 is not lit, the triac is shorted and must be replaced.

Amp draw for each dryer heater should be approximately 3 amps. To get total dryer heater current draw, double these values.

Dryer Heater Check, Continued

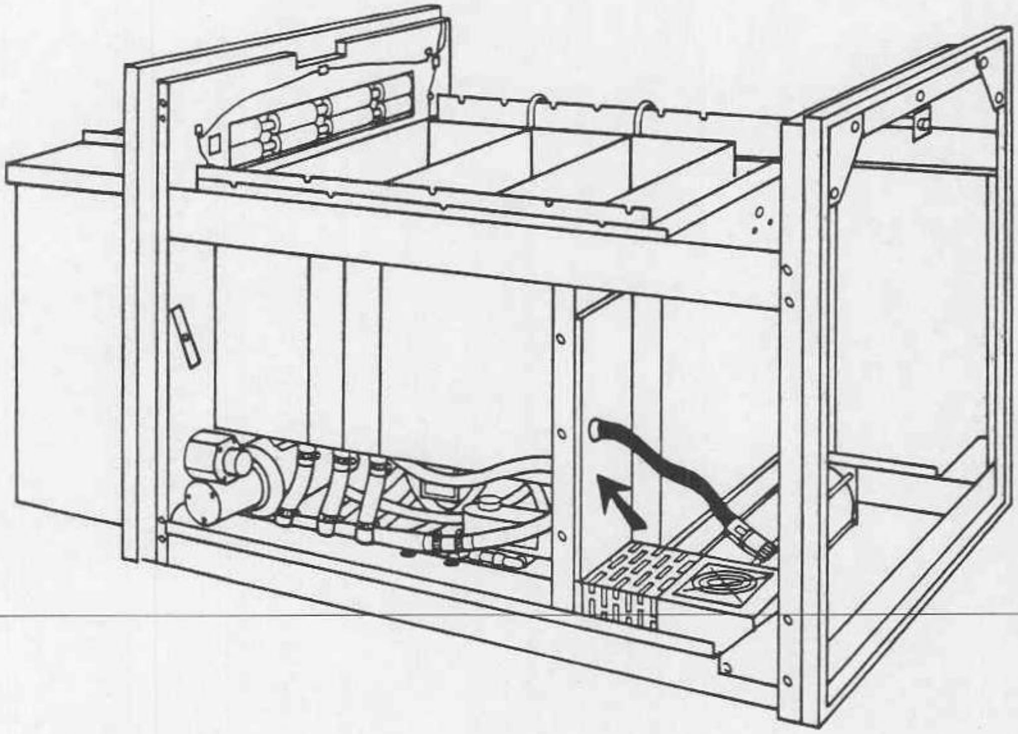


Figure 5-30, Location of Terminal Strip TS3

Dryer Safety thermostat(s)

The dryer safety thermostats (TH1 and TH2) cut off power to the dryer heaters if ambient temperature in the dryer exceeds approximately 165 deg. F (74 deg. C). This could be caused by a constant heat condition (shorted triac) in the dryer, clogged air flow, or a blower motor failure.

The safety thermostats must be manually reset. See Figure 5-31 (front dryer) and Figure 5-32 (lift-out dryer). Allow the dryer to cool before pressing the reset button. If a thermostat trips a second time, remove the dryer assembly, clean it, and check all components.

Dryer Heater Check, Continued

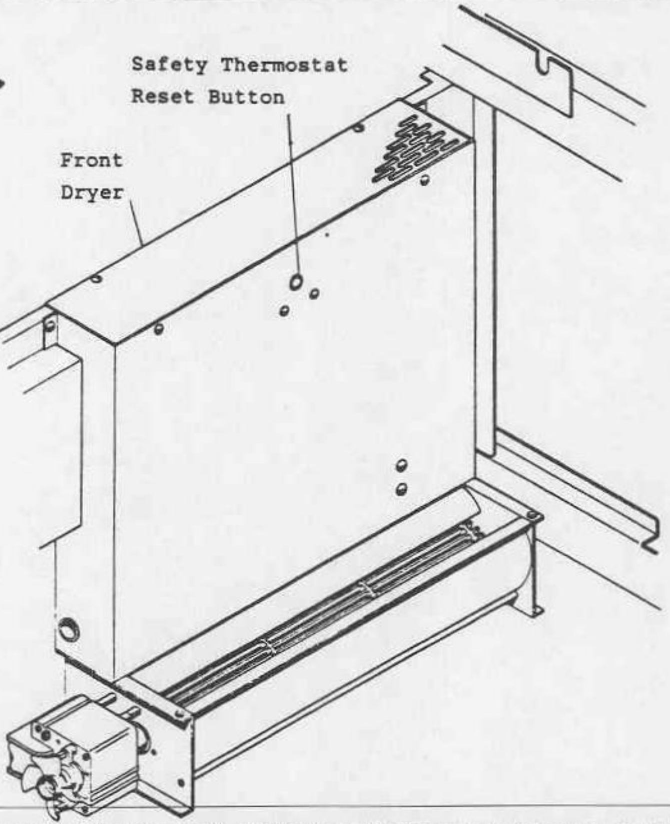

Safety Thermostat
Reset Button
Front
Dryer

Figure 5-31, Front Dryer and Safety Thermostat Reset Button

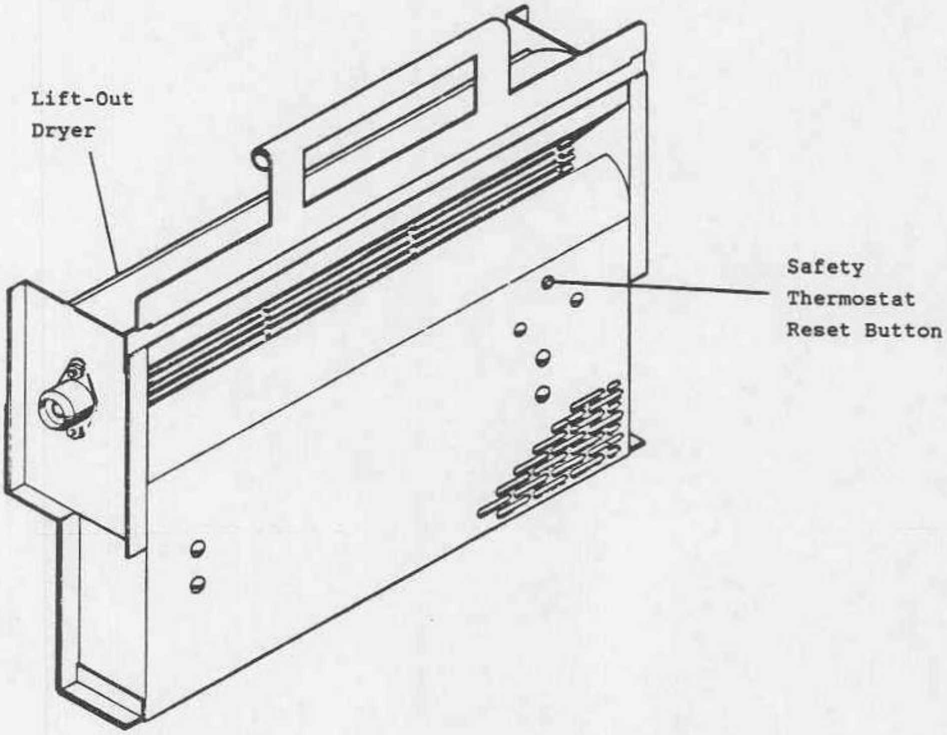

Lift-Out
Dryer
Safety
Thermostat
Reset Button

Figure 5-32, Lift-out Dryer and Safety Thermostat Reset Button

Triac Testing

Caution: Do not turn on machine power with the triac leads disconnected. This will burn out the opto-isolator on the AJ1 PC board. Do not switch the leads on a triac.

1. Disconnect power. Take a piece of tape and mark the wires at the triac so that they are not reversed when reconnected.

2. Remove the wires from the terminal strips at the triac. Use an ohmmeter to check for infinite resistance across terminals MT1 and MT2 (see Figure 5-33).

3. Using a jumper, or the bare ohmmeter probe, connect the gate terminal to terminal MT2. There should now be a low ohms reading across terminals MT1 and MT2.

   NOTE: Some ohmmeters do not provide enough current to activate the triac. Therefore, this is not a sure test. This is only a functional check that can indicate that a triac is probably good.

4. To replace a triac, remove the screws on both sides, disconnect the leads, and pull it off.

Figure 5-33, Triac Check Points

Temperature Sensor Testing

1. Disconnect the leads of the probe from the rest of the circuit, and check for resistance between the leads. The developer sensor is connected to terminal strip TS5, at TS5-2 and TS5-3. The dryer sensor can be checked at TS3-2 and TS3-1.

2. The resistance of the sensor varies with temperature. Figure 5-34 gives the resistance of the sensor according to temperature. Both developer and dryer sensors are the same. If in doubt, check at room temperature.

Temperature		Resistance Ohms (± 10%)
°F	°C	
70	21	1160
77	25	1000
84	29	864
91	33	750
99	37	652
106	41	570
113	45	499
120	49	438
127	53	385
135	57	340

Figure 5-34, Temperature Sensor Resistances

Developer Sensor Removal

1. Disconnect power and drain the developer tank to a level below the sensor.

2. Disconnect the sensor leads. Unscrew the knurled collar on the sensor and pull the sensor out.

3. When installing a new sensor, make sure the O-ring and washer are in place between the tank fitting and the knurled collar (see Figure 5-35). Tighten the collar until the sensor feels snug. Check the fitting for leaks. Perform the "Temperature Calibration" in this section.

Developer Sensor Removal, Continued

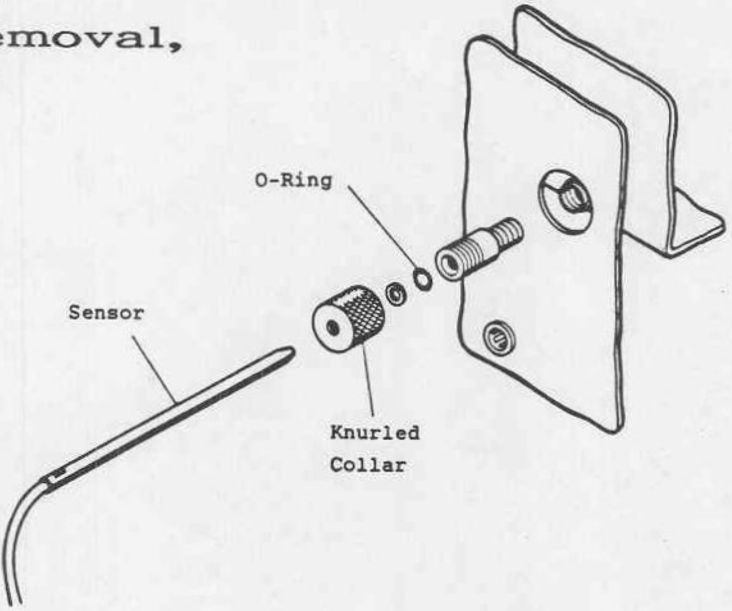


Figure 5-35, Developer Sensor Assembly

Dryer Sensor Removal

1. Disconnect power. Remove the leads from the dryer sensor at TS3. Remove the lift-out dryer and lift-out rack.
2. Remove the four screws securing the cover on the front heater. Drop the cover down to expose the heater components.
3. Loosen the clamp securing the sensor and slide out the sensor.
4. After installing a new sensor, perform the "Temperature Calibration" in this section.

Temperature Dial Test

It is unlikely that a temperature dial will fail or cause a problem. If the temperature dial does not seem to set temperatures properly, however, the swing contactor could be worn. This can be checked by disconnecting power, removing the J3 PC board, removing the potentiometer box, and checking it with an ohmmeter. Resistance across the two leads should vary smoothly from 0 to 2500 ohms as the dial is turned. Perform the "Temperature Calibration" if a dial is replaced.

Temperature Calibration

Whenever replacing the temperature PC board J3, a temperature sensor, or dial, the circuit must be calibrated as follows:

NOTE: Dryer temperature must be checked with the top cover in place.

1. Allow the processor to warm up to the desired temperature setting. The FEED indicator should be lit.

2. Remove the top cover and front panel. Place an accurate process thermometer in the developer solution.

   Caution: Do not use a mercury thermometer, as the mercury will contaminate the tank and rack if the thermometer should break.

3. Measure the voltage between TP3 and TP1 (common) on J3 (see Figure 5-26). Note this voltage (approximately 5.5VDC), and keep the voltmeter hooked up to the test points.

4. Take the actual temperature reading of the developer.

5. Use a small screwdriver at trimpot R4 on J3 for this step. Set the temperature dial to the actual solution temperature, and quickly adjust R4 to bring the voltage back to the previously noted voltage. Calibration of the developer scale offset is now complete.

6. Repeat the same procedure for the dryer. Put a thermometer in the dryer air path to measure actual temperature. Replace the top cover. Measure the voltage of the dryer sensor at TP5, using TP1 as common. Press the film switch to activate drive, and wait 1 min for the dryer to reach full temperature. Trimpot R3 is used to calibrate the dryer. Set the actual dryer air temperature on the temperature dial and adjust R3 to return the voltage at TP5 back to the previously noted voltage.

Blower Motors

The blower motors remain off during initial warm-up of developer solution. They turn on when power is first applied to the dryer heaters, and remain on until power is turned off at the end of the day.

Power to the blower motor can be checked between TS3-4 and TS3-7 while the blower is running. There should be line voltage. The power is switched on when the normally closed relay K3 is switched off after solution warm-up. If the blower is not working at all, check fuse F3.

Technical Descriptions & Theory of Operation

On the following pages are a technical description of the theory of operation of the electronic circuits in the *AFP 14X-3* processor.

These descriptions assume a full technical knowledge of electronics theory and applications to the component level.

Warning: As significant damage or personal injury may result from improper service techniques, only technicians thoroughly familiar with electronic servicing and high voltage repairs should attempt any of the repairs or adjustments described in the following pages.

Operating Sequence - Overall Operation

When the on-off switch S1 is turned on the Dev and Fix circulation pump drive will start. The processor will enter a special start up mode. In this mode the developer level will be checked by the level sensor. The replenisher pump will be run until the level is correct.

Then the developer heater controls will be activated and will heat the developer up to the set temperature, the dryer heater and blowers will not be energized until the developer is at set point the first time. Then the dryer heater and blowers will be brought up to set point temperature. While the dryer is heating the developer heat will be maintained. When both temperatures are up to set point and the developer level is correct the ready light will come on indicating the processor is ready to process film.

NOTE: On units S/N X3-929 and up the K-3 relay has been eliminated. The effect is to power the blowers immediately at machine turn on.

The unit will go into a standby mode after reaching temperature set points, in standby the drive stops, recirculation pumps operate and temperatures are maintained, dryer temperature is set back several degrees in standby.

When a film is introduced the drive system is started and will run for several minutes to allow film to pass through the processor totally. When a film is entering the processor it is sensed by the film entrance switch at the feed tray rollers. While a film is activating the entrance switch the replenishment pump is operated adding developer and fixer. After film enters fully the ready light will light and the audible signal will sound.

During standby mode the processor will periodically enter a jog cycle (for 9 seconds every 3 minutes) in the jog cycle the drive will run to prevent crystallization of chemistry on rollers. If desired the replenishment pump may be programmed to operate during jog cycles by setting the switch on the temperature control PC board to the "LO" position. A manual switch is provided in the control panel to activate the replenishment pump for test and calibration.

Theory of Operation, Continued

Electronic Controls - Introduction

The X3 has a solid state control circuit for all timing and temperature control functions. The circuitry is contained on three circuit boards. They are:

A. PC Assembly - Power 115/230 VAC
   Part No. 575-1701
   (On 115 VAC only units: Power Board is Part No. 575-1700)
B. PC Assembly - Control, Temperature
   Part No. 575-1702
C. PC Assembly - Control, Timing
   Part No. 575-1704

These boards will hereafter be referred to as the Power Board, the Temp Board and the Timing Board.

Circuit Board Functional Description

A. The Power Board's function is as follows:

   1. The power board is a low voltage power supply. It provides +20 volts DC unregulated which is used to operate the Replenisher, Drive and Blower relays, as well as the feed light and audible signal. The unregulated +20VDC power is supplied to the Temperature (Temp) board where it is separately regulated, as well as to an additional +12VDC regulator on the power board.

   2. The +12 VDC regulator is used to power the zero crossing detection circuit on the power board, as well as provide regulated power to the timing board.

   3. There is a zero crossing detection circuit on the power board which is used to generate firing pulses for the Triacs in conjunction with the temp board logic.

   There are NO adjustments on the power board.

Theory of Operation, Continued

B. The Temperature Board's function is as follows:

1. The temp board controls the power level of the developer heater. (The developer heater indirectly controls the fixer temperature.)

2. The temp board controls the power level of the dryer heater. The dryer heater has a standby temperature control to reduce the power delivered to the dryer during the "standby" mode.

3. The temp board controls the power sharing between the developer and dryer heaters in order to limit the line current draw.

4. The temp board senses whether both developer and dryer are at the proper temperature, and signals the timing board of this fact. Circuitry is provided to minimize the effect of transient temperature variations on the ready light. In normal operation the temp ready time out function will generate a loss of ready light 90 seconds after either developer or dryer temperature has fallen below its proportional control range.

5. The temp board has a ramp generator circuit which is used to provide a proportional control range for the developer and dryer temperature controls.

6. The temp board has its own +12 VDC power supply. This power supply is used to prevent fluctuations in the analog signal levels.

7. Circuitry to drive the triac optoisolators is on the temp board.

   The following controls are located on the temp board:

   R1: Developer proportional bandwidth
   R2: Dryer proportional bandwidth
   R3: Dryer scale offset
   R4: Developer scale offset.

Theory of Operation, Continued

C. The Timing Control Board's function is as follows:

1. The timing board contains the developer level sensing circuitry.

2. The timing board accepts the film switch input, and turns on the replenisher pump in response to this.

3. The timing board has a system clock which controls the time ratio of the cycle timer (automatic standby timer), feed signal timer (time between films), jog timer (automatic anti-crystallization cycle), and replenishment timer (short burst of replenishment during machine turn on and during jog).

4. Jog timer, cycle timer, feed signal timer and replenishment timers are located on this board.

5. Transistor drive circuitry is provided to power the following function from the +20 volt power supply.

   a. Drive relay
   b. Run light and run/standby temp relay
   c. Feed light
   d. Audible signal
   e. Replenishment pump relay.

The following controls are on the timer board:

R1: System clock frequency
S1: Replenishment switch.

High means a high film usage installation where jog cycle replenishment is not needed. Low means a low usage installation.

Theory of Operation, Continued

Board Level Theory of Operation.

A. POWER BOARD - Part No. 575-1701 (230 VAC)
- Part No. 575-1700 (115 VAC only systems)

1. POWER SUPPLY: The low voltage (+20 and +12 volt DC) power is supplied from a 16 VAC transformer T-1. This is rectified by CR-5 on the power board, and filtered by capacitor C1. The 12 VDC is regulated by a 7812 three terminal regulator. Capacitors C2 and C3 bypass the regulator and prevent oscillations.

2. ZERO CROSSING: The zero crossing detection circuit uses two optoisolators connected in anti-parallel. Resistors R7 and R8 are current limiting resistors, and are connected directly to the incoming power line. The opto's output circuit are emitter followers. When L1 of the power line is positive compared to N, the LED in U4 is high and current flows through the optotransistor, causing U3 pin 3 to be logic true. Conversely, when L2 is negative with respect to N, U5 conducts and U3 pin 5 is logic true, and U3-3 is low. The two successive stages of U3, a CMOS schmidt trigger inverter gate produces a signal with sharp logic transisitions. See Figure W-1.

   Zero crossing is defined as the coincidence TP2 and TP3 of the power board both being logic low. This signal goes to the temperature board where U12, a 4-wide NOR gate looks for this coincidence, as well as its power burst signal, and thermistor check signals.

3. TRIAC DRIVERS: The triac drivers are optoisolators which generate a short gate turn on pulse. The gate turn on current is limited by R1 and R2 for the developer heater and dryer triacs respectively. The voltage to fire the gates is generated across the triac when it is in its non-conducting state. When the voltage across the triac is approximately 10 volts, there is sufficient current to fire the triac gate. Be sure not to disconnect the load from the triac when testing.

(Continued)

If the voltage across the triac is too great, for too long, resistor R1 and/or R2, as well as the opto will burn out due to a current on 1 ampere flowing through the optoisolator.

The normal gate trigger current, as seen with a Tektronix Model 6302 current probe is shown in Figure W-2.

B. TEMPERATURE CONTROL BOARD - Part No. 575-1702

1. RAMP GENERATOR: The temperature control board senses an error voltage that is produced by comparing the thermistor/set point voltage with the proportional control ramp.

   One of the zero crossing signals from the power board is connected to a 4024 binary counter (U5). A series of weighting resistors is connected to the outputs of U5. These resistors are in-turn connected to the current summing input of U6, pin 2. The resistors are in a binary sequence, and generate a staircase ramp. There are seven bits forming this ramp. At the end of the full count, the counter is not reset, but instead begins to count down because of its overflow and generate a ramp. At TP-7, one can view the amplitude of the ramp, and adjust R1 for 2 volts peak to peak. The ramp runs between 4 and 6 volts DC, with a period of 2 seconds. The waveform is shown in Figure W-3.

   The output of U6-1 is then fed to U6-6 where it is inverted. The dryer ramp may be viewed at TP-2. After adjusting the developer ramp, R2 may be adjusted to produce an amplitude of 3 volts p-p. This ramp has a period of 2 seconds and goes from 4 to 7 volts.

2. CALIBRATION AMPLIFIER: U7A and U8A are CMOS op-amps. They are used as summing amplifiers to add the offset (calibration) voltage to the error signal for the dryer and to add the offset (calibration) voltage to the error signal for the dryer and developer respectively. (Continued)

Theory of Operation, Continued

The voltages present at TP-5 and TP-3 represent the amplified error voltage of the dryer and developer, respectively, in normal operation, after the unit has reached thermal equilibrium, the voltage will vary between 4 and 7 volts DC, with respect to TP-1 (signal ground).

Resistor R-3 controls the dryer scale offset, and is used to cause the dial scale for the dryer temperature to agree with the actual temperature of the air. Similarly R-4 is used to calibrate the developer temperature.

When the unit is warming up, and the temperature error is large, the voltage at TP-5 and TP-3 will be close to zero, and the respective power circuits will be calling for full heat, as limited by the current sharing circuit.

If the dryer or developer temperature is in excess of its linear control range, then the voltage at TP-5 and TP-3 will be approximately 10.5 VDC for the dryer and developer respectively.

3. TEMPERATURE COMPARATOR: Amplifiers U7B and U8B are configured as high gain comparators. Hysteresis is provided by resistors R21 and 24 respectively which will limit oscillations, and provide some latching action. The operation of the dryer and developer comparators may be observed at TP-6 and TP-4. Typical waveforms are shown in Figure W-4.

   Whenever the ramp voltage, which is applied to the inverting input of the comparators (U7B and U8B) exceed the DC input voltage from the previous stage of this circuit (U7A and U8A), the output of the comparator will go low, and heat will be called for, if the remaining logic conditions permit.

Theory of Operation, Continued

4. POWER SHARING CIRCUIT: Power sharing is provided to prevent both the developer and dryer heater from being turned on simultaneously. In addition, power sharing provides preferential heating to the developer solution during start up. This is necessary due to the large volume of solution that must be heated.

   The dryers will warm up relatively quickly, at which time the power is apportioned according to the factory setup of the board during the remaining operation of the processor.

   A series of inhibit signals are present to insure that power sharing takes place.

   On turn on, the input to U11-D is low, causing a high at U11-11. Via the action of NOR gate U10-A and flip-flop formed by U11-B and C, a "1" is produced at U11-4. In addition counter U2 is reset at U2-11. When capacitor C14 charges up, then U2 reset line goes high and the counter may start. If the dryer and developer are not up to temperature, then indicator DS3, "temps ready" will be off, and the timing board will get a "temp wait" signal.

   During startup, the reset line on the Temp Ready Timer, U2-2 toggles from low to high when the output of U11-D performs its power up transition. With the reset line high, the counter output is zero. This puts a "0" on U3A-2.

   The power sharing timer is U5. This is clocked by the zero crossing pulses from the power board. Normally gate U4-A and U3-D decide at which count of the timer priority is shifted from the developer to the dryer. The output of U3-D is initially held low by the action of flip-flop U11-B,C, which was determined to be "1" at turn on. The developer heater will run at 100% power until it reaches the proportional control region.

Theory of Operation, Continued

Once U8B (pin 7) goes high, indicating that the developer is near operating temperature, a series of events takes place.

U4B-5 goes high. This allows the power sharing pulse, which is generated on a one second interval to clock through U4-B, setting U4-4 low.

U10-10 will then clock low. Meanwhile, the dryer is beginning to heat up. As soon as it reaches it proportional region U7B-7 (TP-6) will go high. This will cause the output of U4D-11 to go from "1" to "0". This will in turn reset counter U2.

In order for the Temp Ready light, and therefore the Film Feed light to properly function, both the developer and dryer comparator outputs must either be "1" or make periodic transitions before U2 reaches the end of count. Every time the comparator output goes high, the Time Out counter is reset.

Power sharing is effected via the effect of CR-2 on the developer sense circuit. When the output of U10 goes high, voltage is supplied to the positive input of op amp U8B-5. This turns off the developer heat. When the developer heat is off, U8B-7 is high. This in turn supplies power to the output driver, U9B via its open collector pull up resistor R36. In normal operation the developer calls for little heat. The dryer needs more heat, and is allowed to run whenever the developer is not calling for heat.

5. TRIAC DRIVE CIRCUITRY: The triacs require a pulse at the zero crossing of each half cycle of the power line. The triacs are optocoupled to the logic, as described in the power section. The opto drive pulses are generated by U9 which is either a Teledyne 394AL or a National DS3634. (Continued)

These are open collector NOR gates. Because the optos, and their associated indicator LEDs DS1 and DS2 (for the developer and the dryer) are capacitive coupled, the circuit will not function if the zero crossing pulses are missing or defective.

In order for the opto's to be triggered, all inputs to U12A or B must be low. Thus, both zero crossing pulses must be low, which will occur at the true zero crossing.

The respective comparator output must be low and the thermistor must be connected.

At each zero crossing, a pulse will be generated by U12A or B. This is inverted by U13A or B, which is then inverted by U9B or A. In addition, the solution level signal must be satisfied, and be low at U9-2.

When power is called for DS1 or DS2 will be lit. If the optoisolator is removed or its LED is open, the indicators will not go on. These indicators are key troubleshooting aids.

6. BLOWER CONTROL CIRCUIT:

NOTE: On units S/N X3-929 and up the K-3 relay has been eliminated. The effect is to power the blowers immediately at machine turn on.

A circuit is included to prevent the dryer blower from operating during the developer warm up period. A latching circuit is made from the heavy positive feedback around U13. Initially the output of U13 is low. This, in turn, pulls the base of PNP transistor Q-2 low, causing Q-2 to conduct. The fan relay, R-3 on the power board is normally closed. Energizing the coil turns off the fan.

When the developer reaches temperature, U8B-7 goes high, causing the latch formed by U13D to go high, and turn off relay R-3. The fans will then go on.

Theory of Operation, Continued

7. DRYER STANDBY: When the unit goes into standby, the dryer temperature is reduced to the extent possible, to insure recovery when a film is fed. Relay K-1 is opened, reducing the reference current to the thermistor circuit by removing R30 from its parallel combination with R29.

Wave Forms

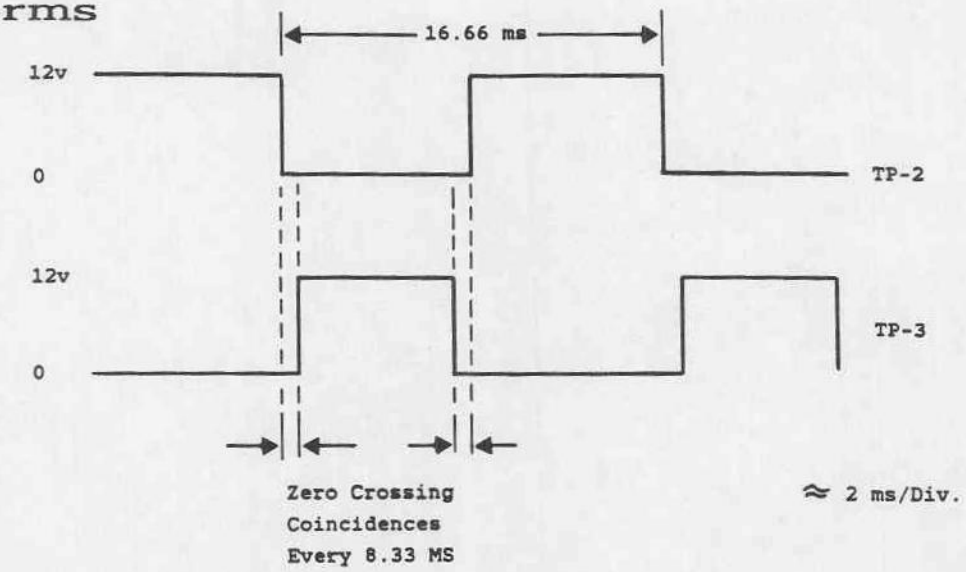

16.66 ms
12v
0
TP-2
12v
TP-3
0
Zero Crossing
Coincidences
Every 8.33 MS
≈ 2 ms/Div.

Figure W-1, Power Board Zero Crossing Circuit

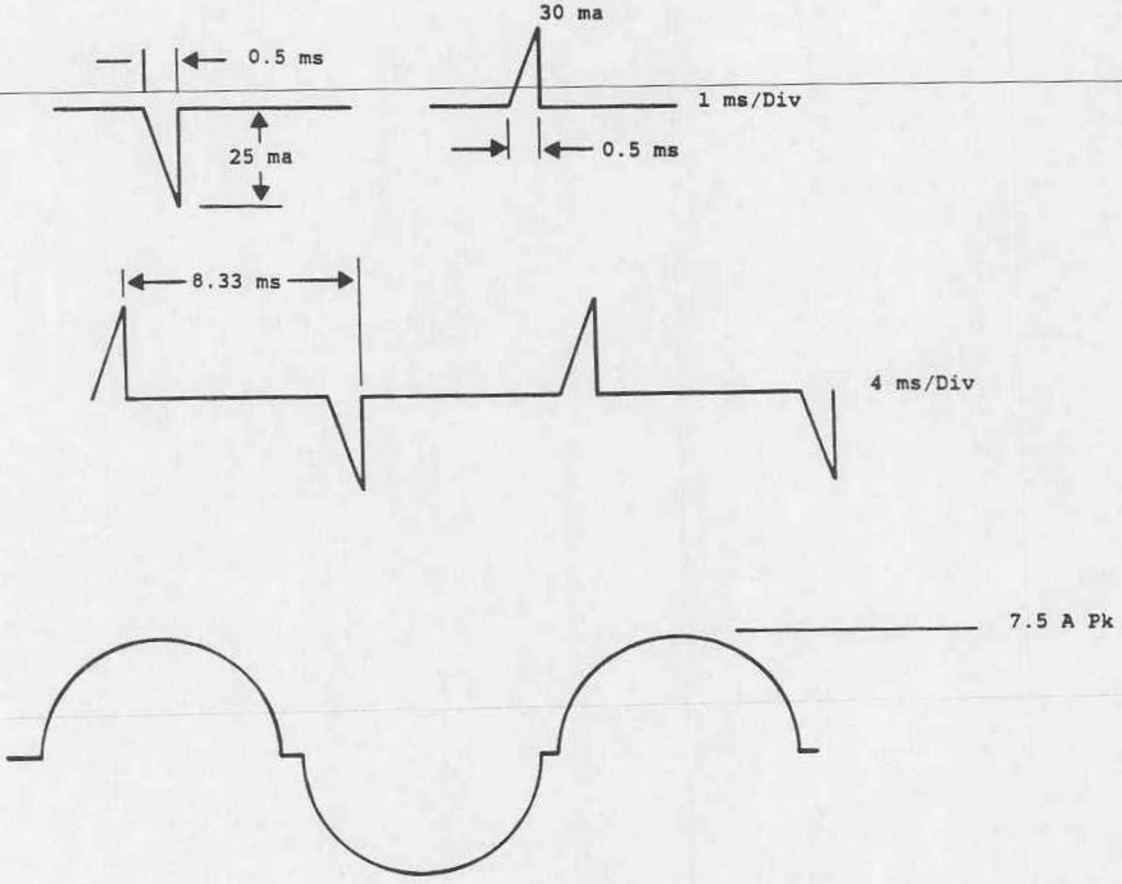

30 ma
0.5 ms
1 ms/Div
25 ma
0.5 ms
8.33 ms
4 ms/Div
7.5 A Pk

Figure W-2, Dryer/Developer Current

Wave Forms, Continued

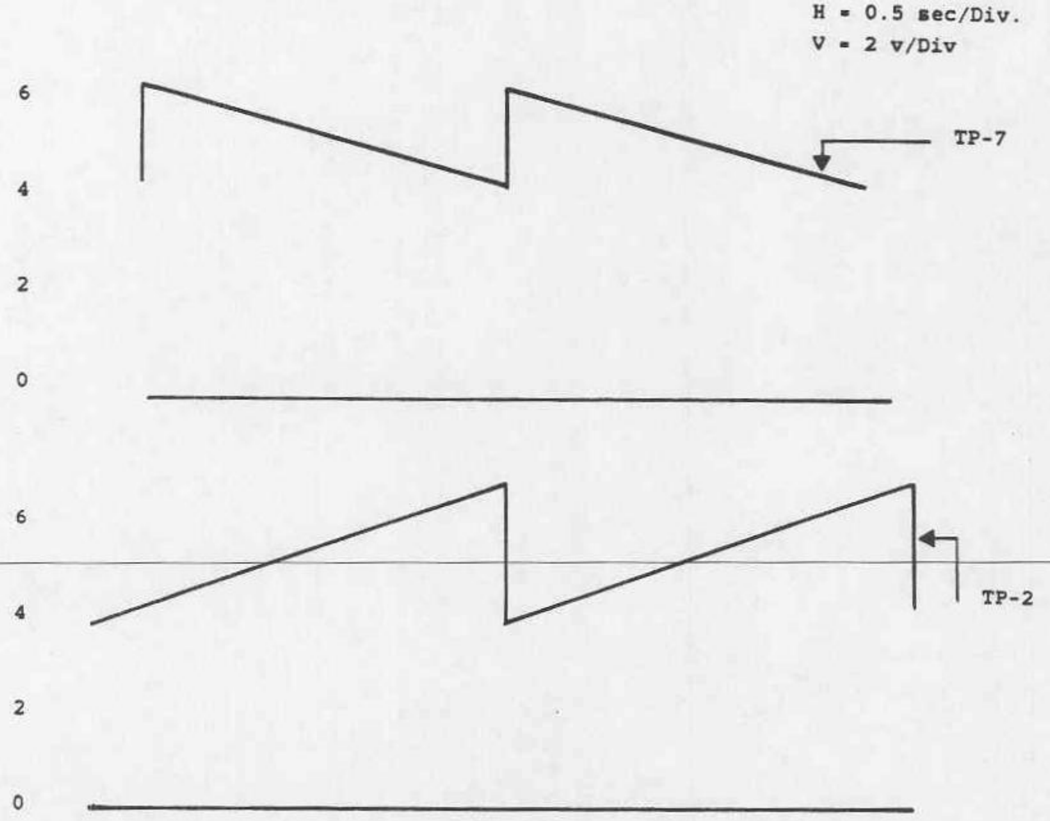


Figure W-3, Temp Board Wave Forms

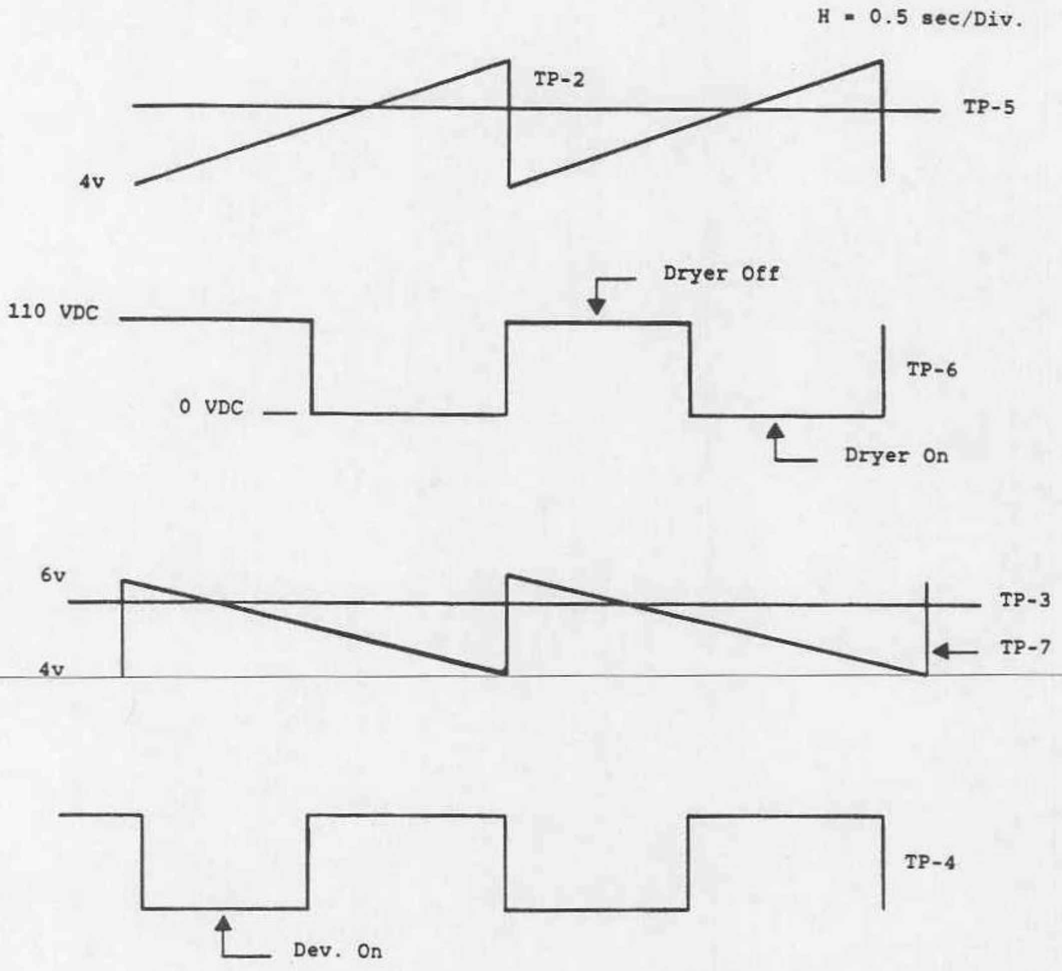

H = 0.5 sec/Div.
TP-2
TP-5
4v
Dryer Off
110 VDC
TP-6
0 VDC
Dryer On
6v
TP-3
TP-7
4v
TP-4
Dev. On

Figure W-4, Temp Board Waveforms

Wiring Diagrams

The following pages contain the wiring diagrams for the *AFP 14X-3* processor.

Index

The following diagrams are included in this section. Note that Figures 5-37 & 5-38 are on multiple sheets.

Figure 5-36, Schematic Diagram, Sheet 1 of 3 **5-75**
Figure 5-36, Schematic Diagram, Sheet 2 of 3 **5-76**
Figure 5-36, Schematic Diagram, Sheet 3 of 3 **5-77**

Figure 5-37, Wiring Diagram, Sheet 1 of 3 **5-78**
Figure 5-37, Wiring Diagram, Sheet 2 of 3 **5-79**
Figure 5-37, Wiring Diagram, Sheet 3 of 3 **5-80**

Figure 5-38, Power Board **5-81**

Figure 5-39, Timing Control Board **5-82**

Figure 5-40, Temperature Control Board **5-83**

Node Identification System

As these diagrams use a **Node Identification System** for identifying wires and junctions it is important that you read and understand the following before attempting to use the diagrams.

A node is a junction between two or more circuit elements. Examples of circuit elements include, but are not limited to: switches, fuses, coils, capacitors, relay contacts, resistors, motors, circuit breakers, transistors, heaters, sensors, transformers, diodes, lamps, etc.

A node may consist of only one wire, as a wire between one relay contact and another, or a bundle of hundreds of wires, jumpers, terminal strip points and splices, such as a common return on a large control circuit.

Each node has its own unique number. Every node is shown on the elementary schematic diagram as a circled number at the nodes approximate location in the circuit. All wires are identified by a node number.

Wire Numbering System

Each wire or jumper is identified on the wiring diagram by its node number, a dash (-), and a second number that represents the wire number in that node. As such, a wire marked 7-12 is wire number 12 of node 7.

When a wire or jumper is used to interconnect nodes, the second number will start with a "0" (zero) and is followed by another node number. For example: wire 50-060 is a jumper that connects node 50 to node 60.

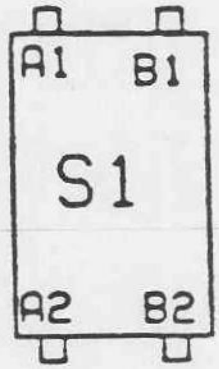
If a connection can be made from one node to one of several other nodes, the second number is always -00 (double zero).

Terminal Identification, Wiring Conventions

Poles on components are identified as "A", "B", "C", etc. in either left-to-right or top-to-bottom order.

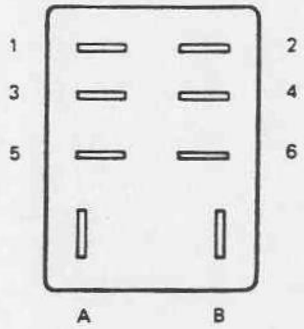
Switch poles are identified as "A" and "B" from left-to-right. Switch pole contacts are identified as 1 (top position) and 2 (bottom position).

Samples are shown below.

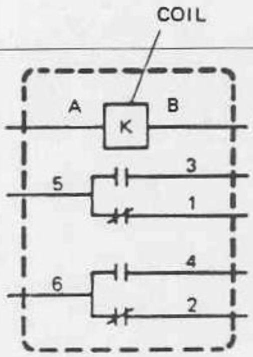


Switch Base, Typical

Terminal Identification, Wiring Conventions, Continued



Relay, Bottom View


COIL
A
K
B
5
3
1
6
4
2

Relay, Schematic

Notes:

Schematic Diagram

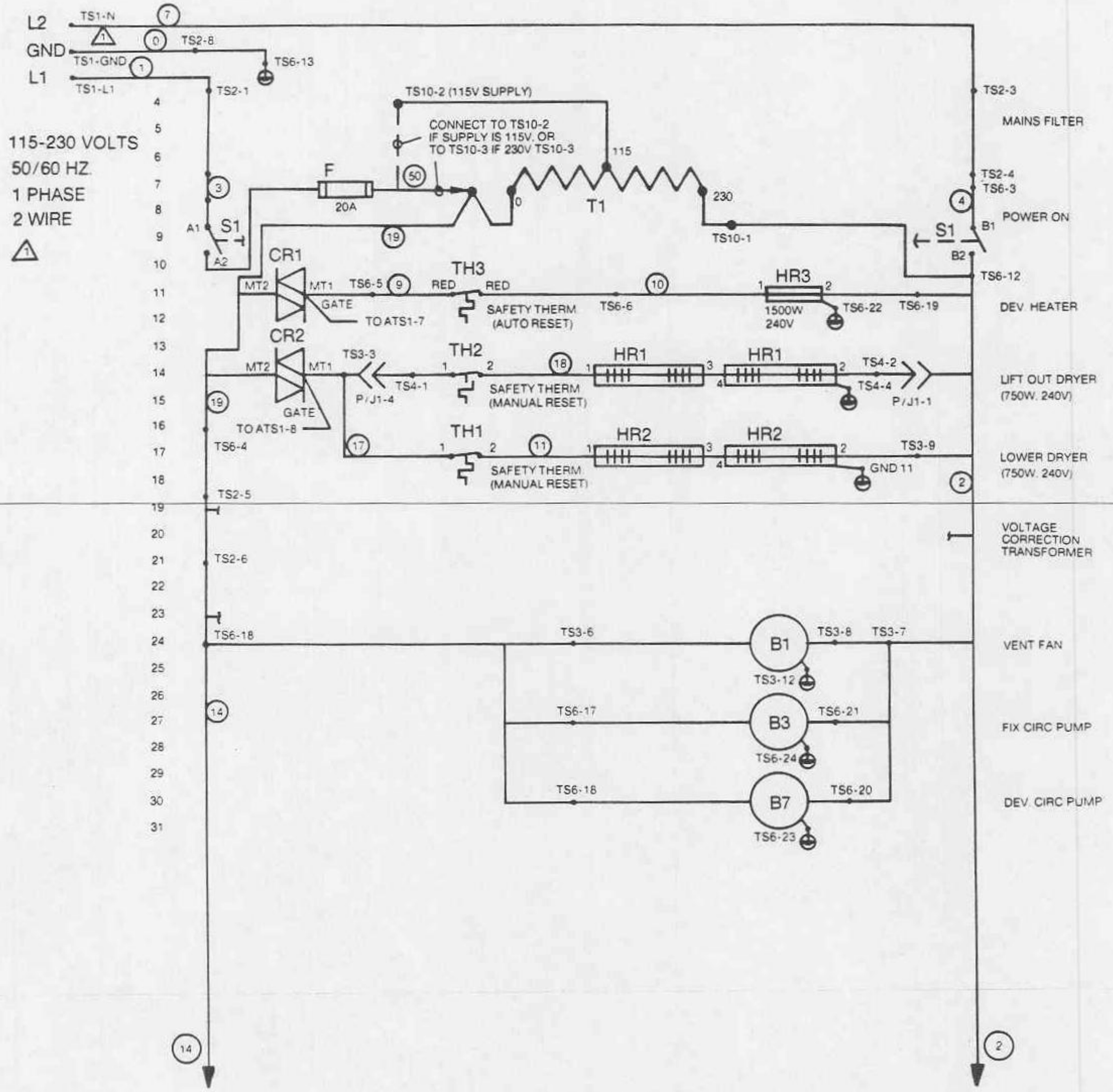
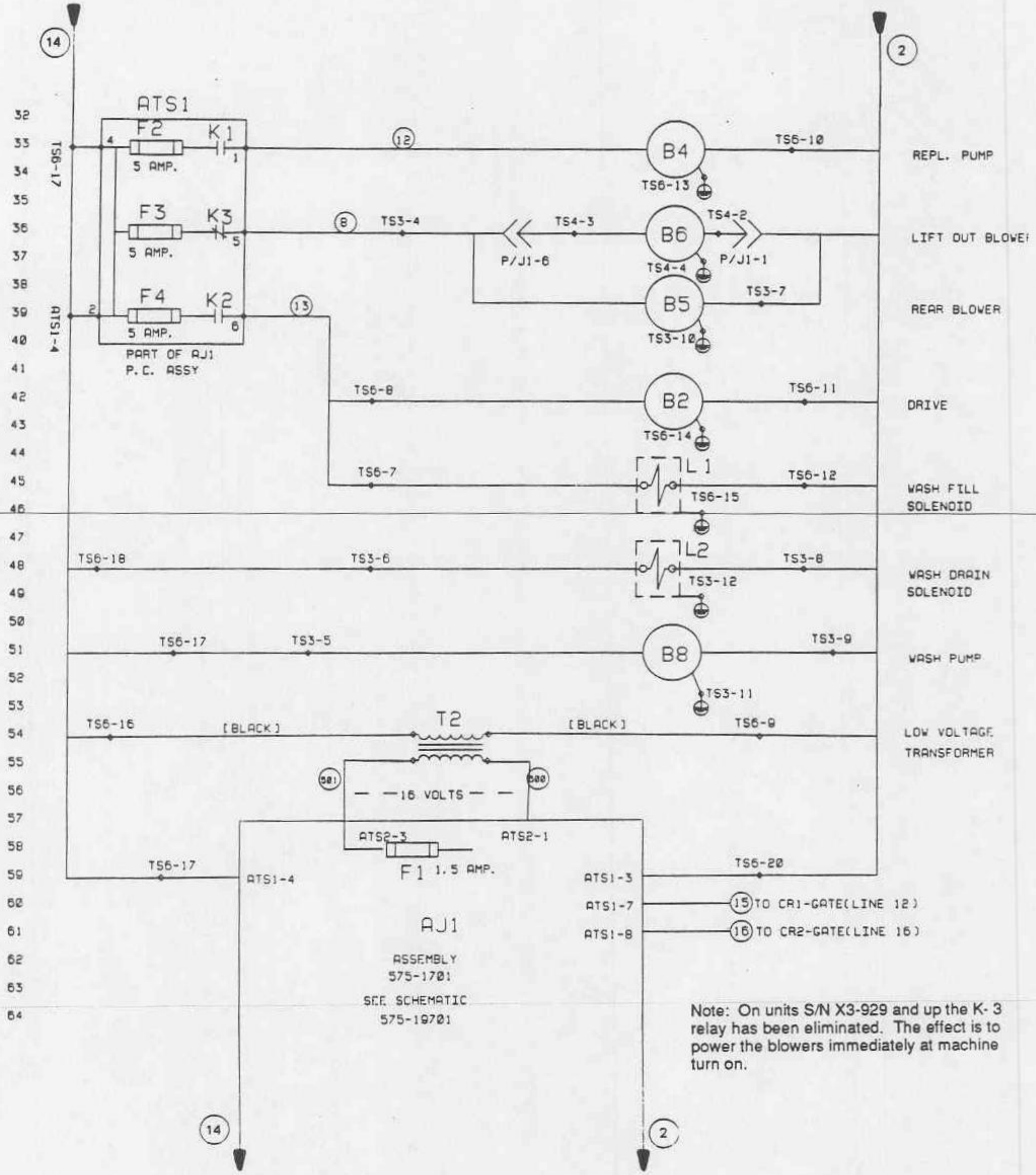

L2
TS1-N
⚠1
7
GND
0
TS2-8
TS1-GND
1
TS6-13
L1
TS1-L1
TS2-1
115-230 VOLTS
50/60 HZ.
1 PHASE
2 WIRE
⚠1
TS10-2 (115V SUPPLY)
CONNECT TO TS10-2
IF SUPPLY IS 115V. OR
TO TS10-3 IF 230V TS10-3
115
50
F
20A
3
0
T1
230
TS10-1
19
A1
S1
A2
S1
B1
B2
CR1
MT2
MT1
GATE
TS6-5
9
TO ATS1-7
TH3
RED
RED
SAFETY THERM
(AUTO RESET)
TS6-6
10
HR3
1
2
1500W
240V
TS6-22
TS6-19
CR2
MT2
MT1
GATE
TO ATS1-8
19
TS3-3
P/J1-4
TS4-1
TH2
1
2
SAFETY THERM
(MANUAL RESET)
18
HR1
HR1
1
3
4
2
TS4-2
TS4-4
P/J1-1
17
TH1
1
2
11
SAFETY THERM
(MANUAL RESET)
HR2
HR2
1
3
4
2
TS3-9
GND 11
2
TS6-4
TS2-5
TS2-6
TS6-18
14
TS2-3
MAINS FILTER
TS2-4
TS6-3
4
POWER ON
TS6-12
DEV HEATER
LIFT OUT DRYER
(750W. 240V)
LOWER DRYER
(750W. 240V)
VOLTAGE
CORRECTION
TRANSFORMER
TS3-6
B1
TS3-8
TS3-7
TS3-12
VENT FAN
TS6-17
B3
TS6-21
TS6-24
FIX CIRC PUMP
TS6-18
B7
TS6-20
TS6-23
DEV. CIRC PUMP
14
2
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

Figure 5-36, Schematic Diagram, Sheet 1 of 3

Schematic Diagram


14
2
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
TS6-17
ATS1-4
ATS1
F2
K1
4
1
5 AMP.
F3
K3
5
5 AMP.
F4
K2
2
6
5 AMP.
PART OF AJ1
P.C. ASSY
12
8
13
TS3-4
TS4-3
P/J1-6
B4
TS6-13
TS6-10
B6
TS4-2
TS4-4
P/J1-1
B5
TS3-7
TS3-10
REPL. PUMP
LIFT OUT BLOWER
REAR BLOWER
TS6-8
B2
TS6-14
TS6-11
DRIVE
TS6-7
L1
TS6-15
TS6-12
WASH FILL
SOLENOID
TS6-18
TS3-6
L2
TS3-12
TS3-8
WASH DRAIN
SOLENOID
TS6-17
TS3-5
B8
TS3-11
TS3-9
WASH PUMP
TS6-16
[BLACK]
T2
[BLACK]
TS6-9
LOW VOLTAGE
TRANSFORMER
501
500
16 VOLTS
ATS2-3
ATS2-1
F1 1.5 AMP.
TS6-17
ATS1-4
ATS1-3
TS6-20
ATS1-7
15 TO CR1-GATE(LINE 12)
ATS1-8
16 TO CR2-GATE(LINE 16)
AJ1
ASSEMBLY
575-1701
SEE SCHEMATIC
575-19701
14
2

Note: On units S/N X3-929 and up the K- 3 relay has been eliminated. The effect is to power the blowers immediately at machine turn on.

Figure 5-36, Schematic Diagram, Sheet 2 of 3

Schematic Diagram

Note: On units S/N X3-929 and up the K- 3 relay has been eliminated. The effect is to power the blowers immediately at machine turn on.

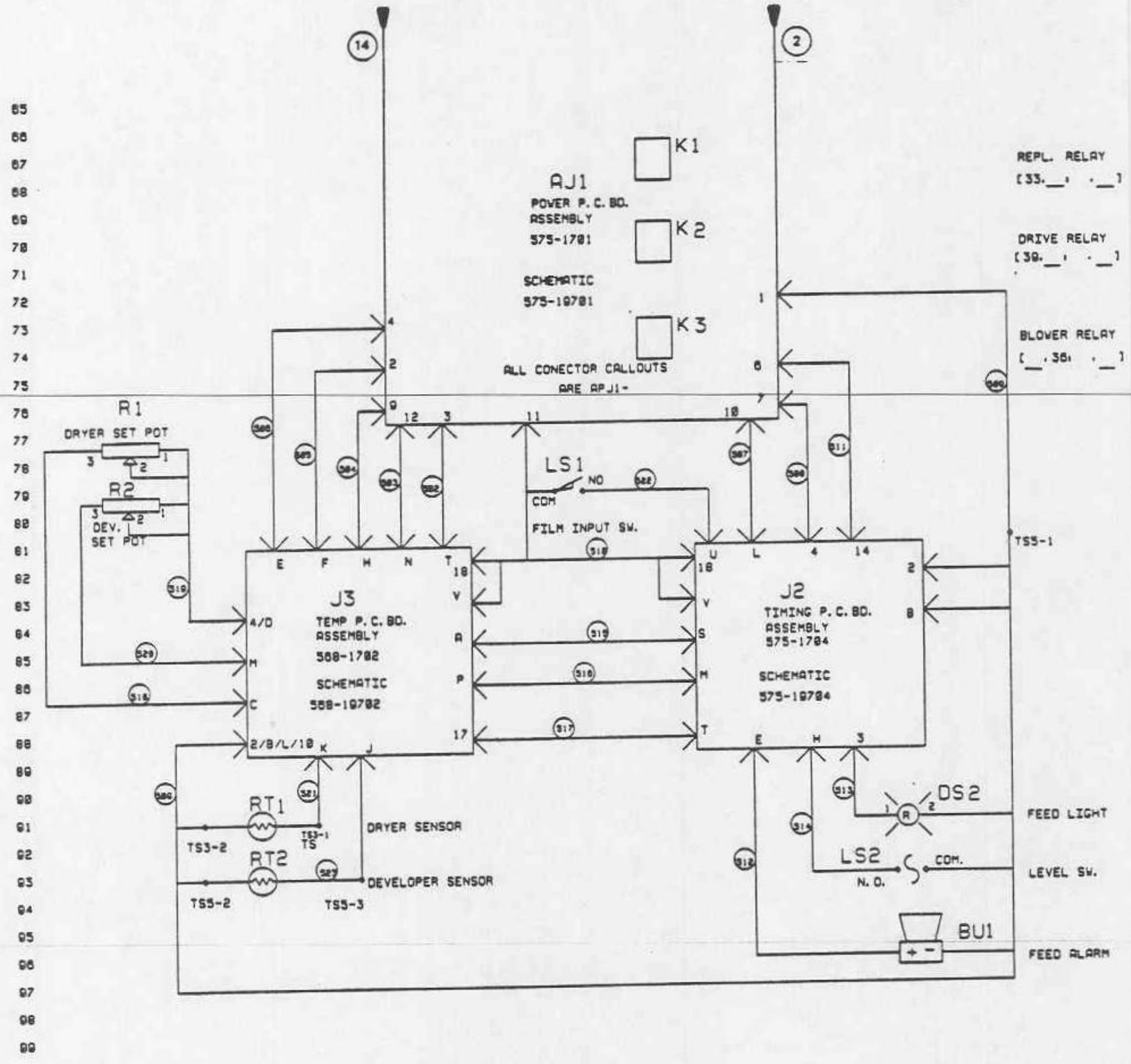

14
2
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
K1
K2
K3
AJ1
POWER P. C. BD.
ASSEMBLY
575-1701
SCHEMATIC
575-10701
ALL CONECTOR CALLOUTS
ARE APJ1-
REPL. RELAY
[33.__, .__]
DRIVE RELAY
[30.__, .__]
BLOWER RELAY
[__.36, .__]
4
2
9
12
3
11
10
1
6
7
R1
DRYER SET POT
3
2
1
R2
DEV.
SET POT
506
505
504
503
502
507
508
511
509
LS1
NO
COM
FILM INPUT SW.
522
518
TS5-1
E
F
H
N
T
10
V
A
P
17
4/D
M
C
2/8/L/10
K
J
J3
TEMP P. C. BD.
ASSEMBLY
568-1702
SCHEMATIC
568-10702
519
520
518
515
516
517
U
L
4
14
10
V
S
M
T
E
H
3
2
8
J2
TIMING P. C. BD.
ASSEMBLY
575-1704
SCHEMATIC
575-10704
500
521
RT1
TS3-1
TS
TS3-2
DRYER SENSOR
RT2
527
DEVELOPER SENSOR
TS5-2
TS5-3
513
DS2
1
R
2
FEED LIGHT
514
LS2
N. O.
COM.
LEVEL SW.
512
BU1
+ −
FEED ALARM

Figure 5-36, Schematic Diagram, Sheet 3 of 3

Wiring Diagram

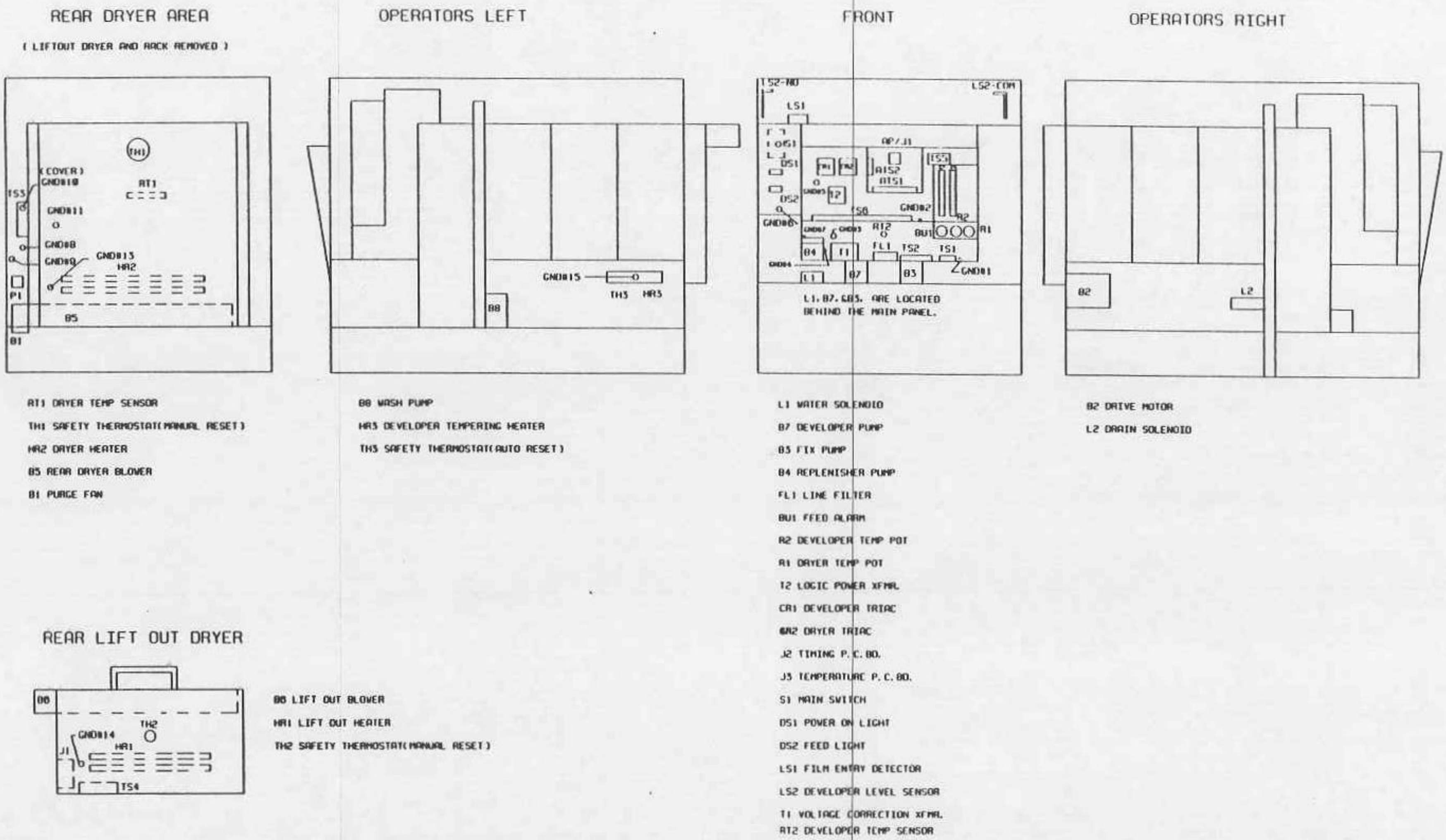

REAR DRYER AREA
(LIFTOUT DRYER AND RACK REMOVED)
(COVER)
GND#10
TS3
GND#11
GND#8
GND#9
GND#13
HR2
TH1
RT1
P1
B5
B1
RT1 DRYER TEMP SENSOR
TH1 SAFETY THERMOSTAT(MANUAL RESET)
HR2 DRYER HEATER
B5 REAR DRYER BLOWER
B1 PURGE FAN
OPERATORS LEFT
GND#15
TH3
HR3
B8
B8 WASH PUMP
HR3 DEVELOPER TEMPERING HEATER
TH3 SAFETY THERMOSTAT(AUTO RESET)
FRONT
LS2-NO
LS2-COM
LS1
DS1
DS2
AP/J1
RT52
RT51
TS5
GND#2
R2
R1
BU1
RT2
TS8
FL1
TS2
TS1
GND#1
GND#6
B4
T1
B7
B3
L1
L1, B7, &B3. ARE LOCATED BEHIND THE MAIN PANEL.
L1 WATER SOLENOID
B7 DEVELOPER PUMP
B3 FIX PUMP
B4 REPLENISHER PUMP
FL1 LINE FILTER
BU1 FEED ALARM
R2 DEVELOPER TEMP POT
R1 DRYER TEMP POT
T2 LOGIC POWER XFMR.
CR1 DEVELOPER TRIAC
CR2 DRYER TRIAC
J2 TIMING P.C. BD.
J3 TEMPERATURE P.C. BD.
S1 MAIN SWITCH
DS1 POWER ON LIGHT
DS2 FEED LIGHT
LS1 FILM ENTRY DETECTOR
LS2 DEVELOPER LEVEL SENSOR
T1 VOLTAGE CORRECTION XFMR.
RT2 DEVELOPER TEMP SENSOR
OPERATORS RIGHT
B2
L2
B2 DRIVE MOTOR
L2 DRAIN SOLENOID
REAR LIFT OUT DRYER
B6
TH2
GND#14
HR1
J1
TS4
B6 LIFT OUT BLOWER
HR1 LIFT OUT HEATER
TH2 SAFETY THERMOSTAT(MANUAL RESET)

Figure 5-37, Wiring Diagram, Sheet 1 of 3

Wiring Diagram

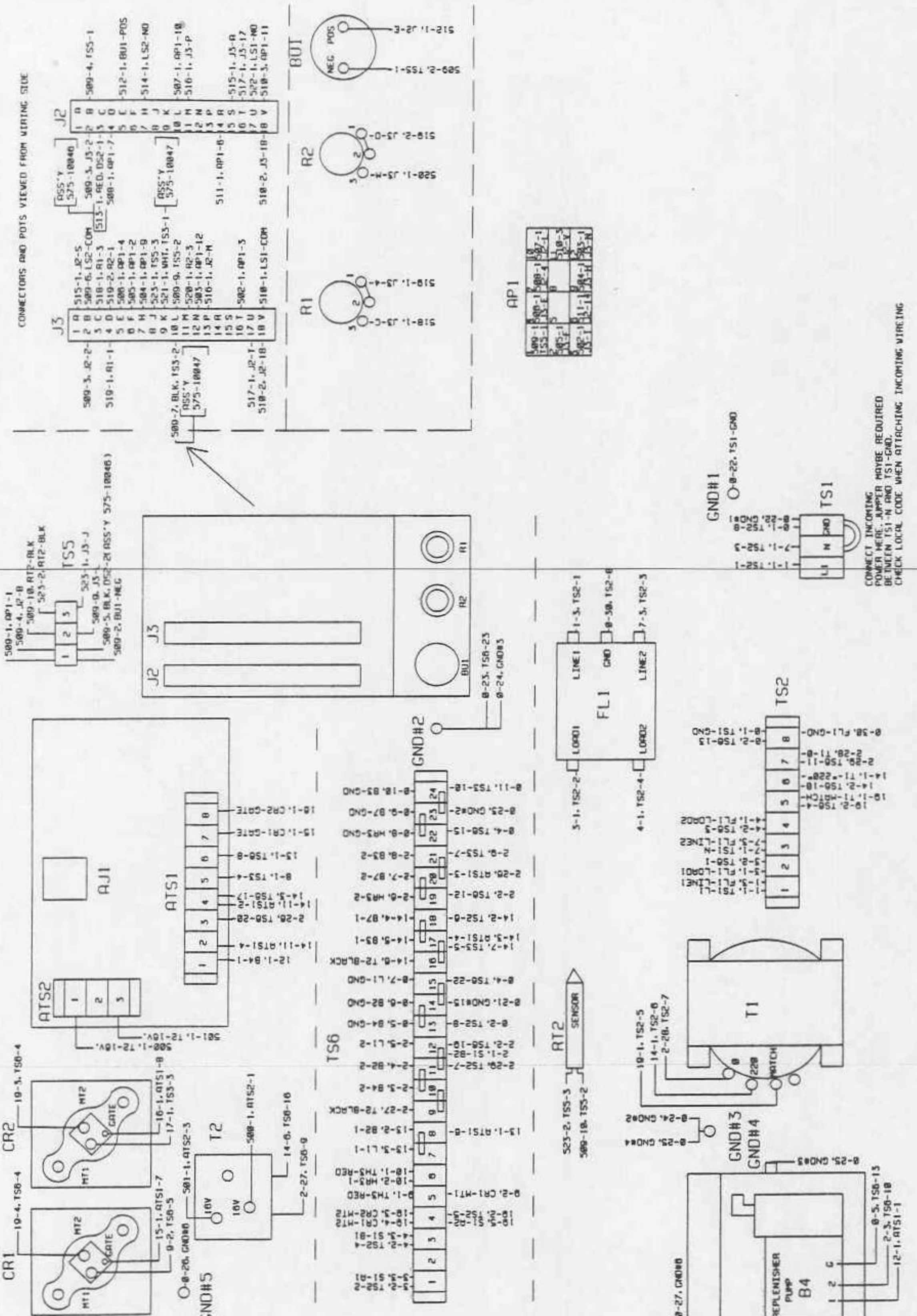

CONNECTORS AND POTS VIEWED FROM WIRING SIDE
J3
J2
R1
R2
BUI
NEG
POS
AP1
TS5
J2
J3
BU1
R2
R1
GND#1
TS1
L1
N
GND
CONNECT INCOMING POWER HERE. JUMPER MAYBE REQUIRED BETWEEN TS1-N AND TS1-GND. CHECK LOCAL CODE WHEN ATTACHING INCOMING WIREING
CR2
CR1
MT1
MT2
GATE
T2
16V
GND#5
ATS2
AJ1
ATS1
TS6
GND#2
FL1
LINE1
GND
LINE2
LOAD1
LOAD2
RT2
SENSOR
TS2
T1
GND#3
GND#4
GND#7
REPLENISHER PUMP
B4

Figure 5-37, Wiring Diagram, Sheet 2 of 3

Wiring Diagram

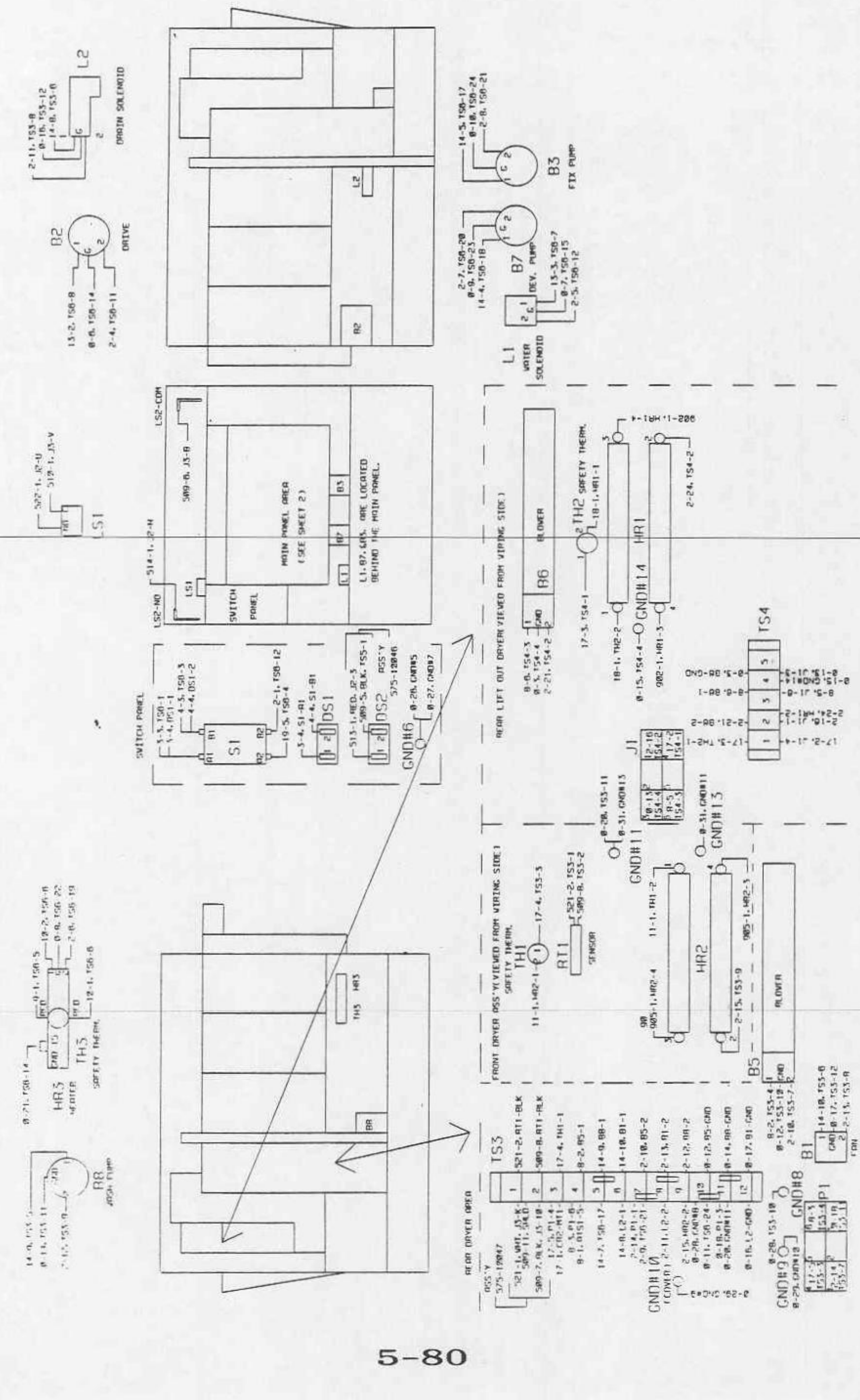
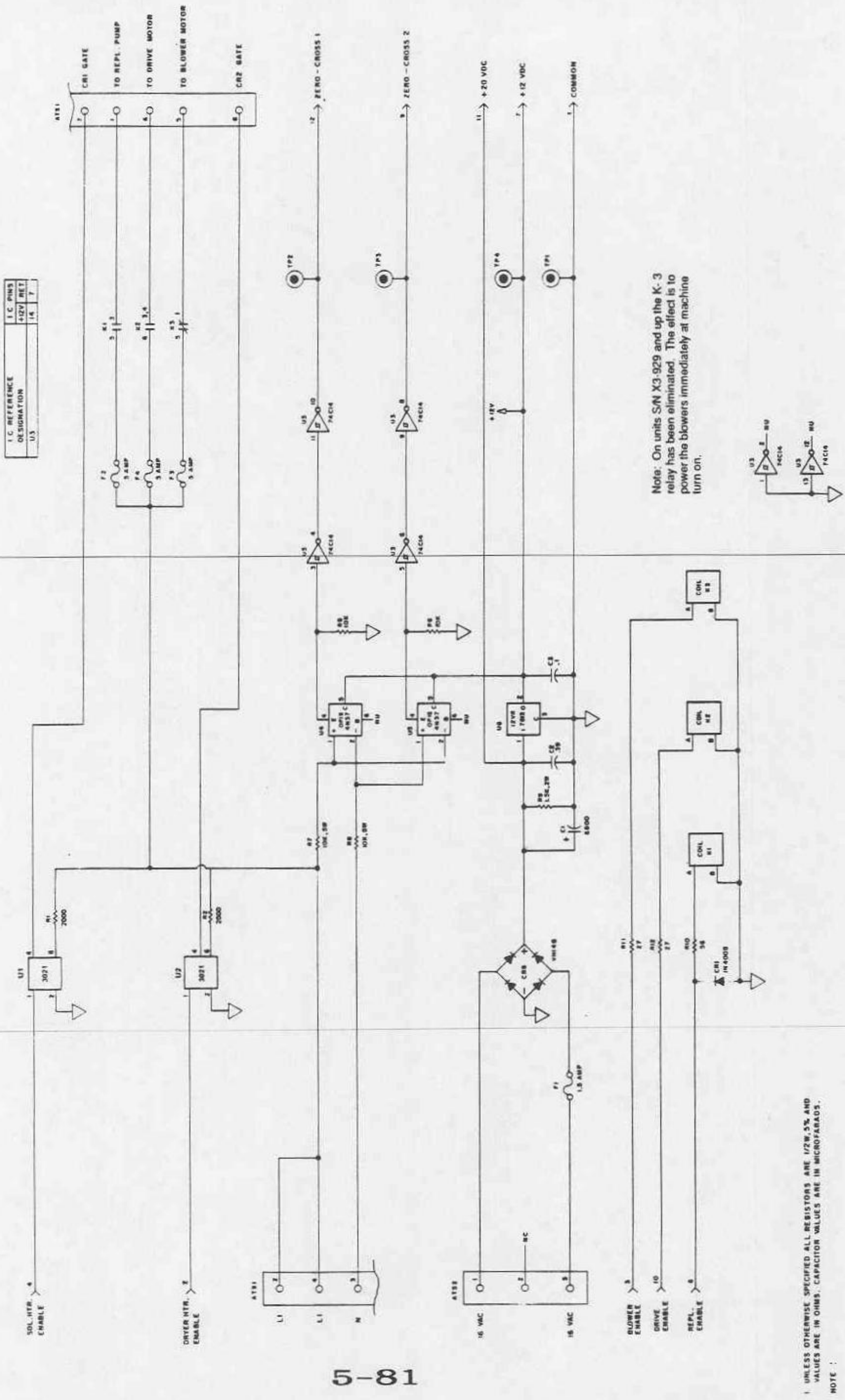

L2
DRAIN SOLENOID
B2
DRIVE
B3
FIX PUMP
B7
DEV. PUMP
L1
WATER SOLENOID
LS1
LS2-COM
LS2-NO
SWITCH PANEL
MAIN PANEL AREA (SEE SHEET 2)
L1, B7, &B3, ARE LOCATED BEHIND THE MAIN PANEL.
S1
DS1
DS2
ASS'Y 575-12046
GND#6
REAR LIFT OUT DRYER (VIEWED FROM VIPING SIDE)
B6
BLOWER
TH2 SAFETY THERM.
HR1
GND#14
TS4
J1
GND#13
GND#11
FRONT DRYER ASS'Y (VIEWED FROM WIRING SIDE)
TH1 SAFETY THERM.
RT1
SENSOR
HR2
B5
BLOWER
TS3
REAR DRYER AREA
ASS'Y 575-12047
GND#10
GND#8
GND#9
B1
FAN
P1
HR3 HEATER
TH3 SAFETY THERM.
B8 WASH PUMP
TH3
HR3
B8
B2

Figure 5-37, Wiring Diagram, Sheet 3 of 3

Power Board


AT81
CR1 GATE
TO REPL. PUMP
TO DRIVE MOTOR
TO BLOWER MOTOR
CR2 GATE
ZERO-CROSS 1
ZERO-CROSS 2
+20 VDC
+12 VDC
COMMON
TP2
TP3
TP4
TP1
I.C. REFERENCE DESIGNATION
U3
I.C. PINS
+12V
14
RET
7
K1
K2
K3
F2
F4
F3
3 AMP
U3
74C14
+12V
OPI5 4N37
U4
U5
U6
12VR
R5
R6
C3
C2
C1
6800
R7
R8
10K,3W
R9
R1
2000
R2
2000
U1
U2
3021
CR8
VM148
F1
1.5 AMP
COIL K1
COIL K2
COIL K3
R10
R11
R12
CR1
1N4005
SOL. HTR. ENABLE
DRYER HTR. ENABLE
AT91
L1
L1
N
AT82
16 VAC
16 VAC
NC
BLOWER ENABLE
DRIVE ENABLE
REPL. ENABLE
NOTE:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2W,5% AND VALUES ARE IN OHMS. CAPACITOR VALUES ARE IN MICROFARADS.

Note: On units S/N X3-929 and up the K-3 relay has been eliminated. The effect is to power the blowers immediately at machine turn on.

Figure 5-38, Power Board

Timing Control Board

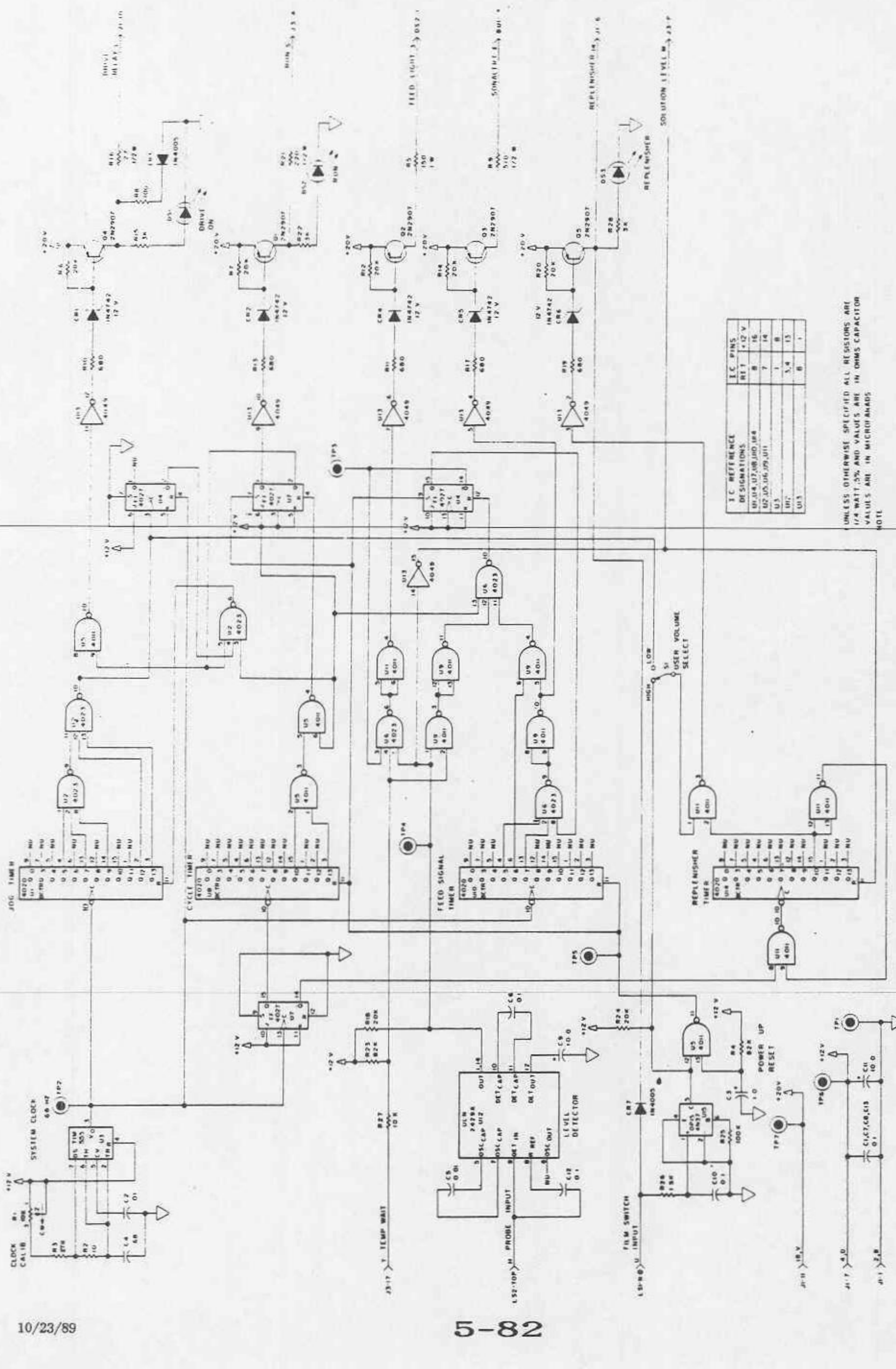

SYSTEM CLOCK 60 HZ
TP1
TP2
TP3
TP4
TP5
TP6
TP7
CLOCK CALIB
JOG TIMER
CYCLE TIMER
FEED SIGNAL TIMER
REPLENISHER TIMER
LEVEL DETECTOR
ULN 2429A CAP U12
POWER UP RESET
S1 USER VOLUME SELECT
HIGH
LOW
TEMP WAIT
PROBE INPUT
FILM SWITCH INPUT
DRIVE ON
RUN
REPLENISHER
DRIVE HEAT
RUN
FEED LIGHT
SONALERT
REPLENISHER
SOLUTION LEVEL
2N2907
IN4742 12 V
IN4005
4020
4027
4023
4011
4049
555
+20 V
+12 V
IC REFERENCE DESIGNATIONS
IC PINS
RET
+12 V
U1,U4,U7,U8,U10,U14 8 16
U2,U5,U6,U9,U11 7 14
U3 1 8
U12 5,4 13
U13 8 1
NOTE
UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4 WATT,5% AND VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS

Figure 5-39, Timing Control Board

Temperature Control Board

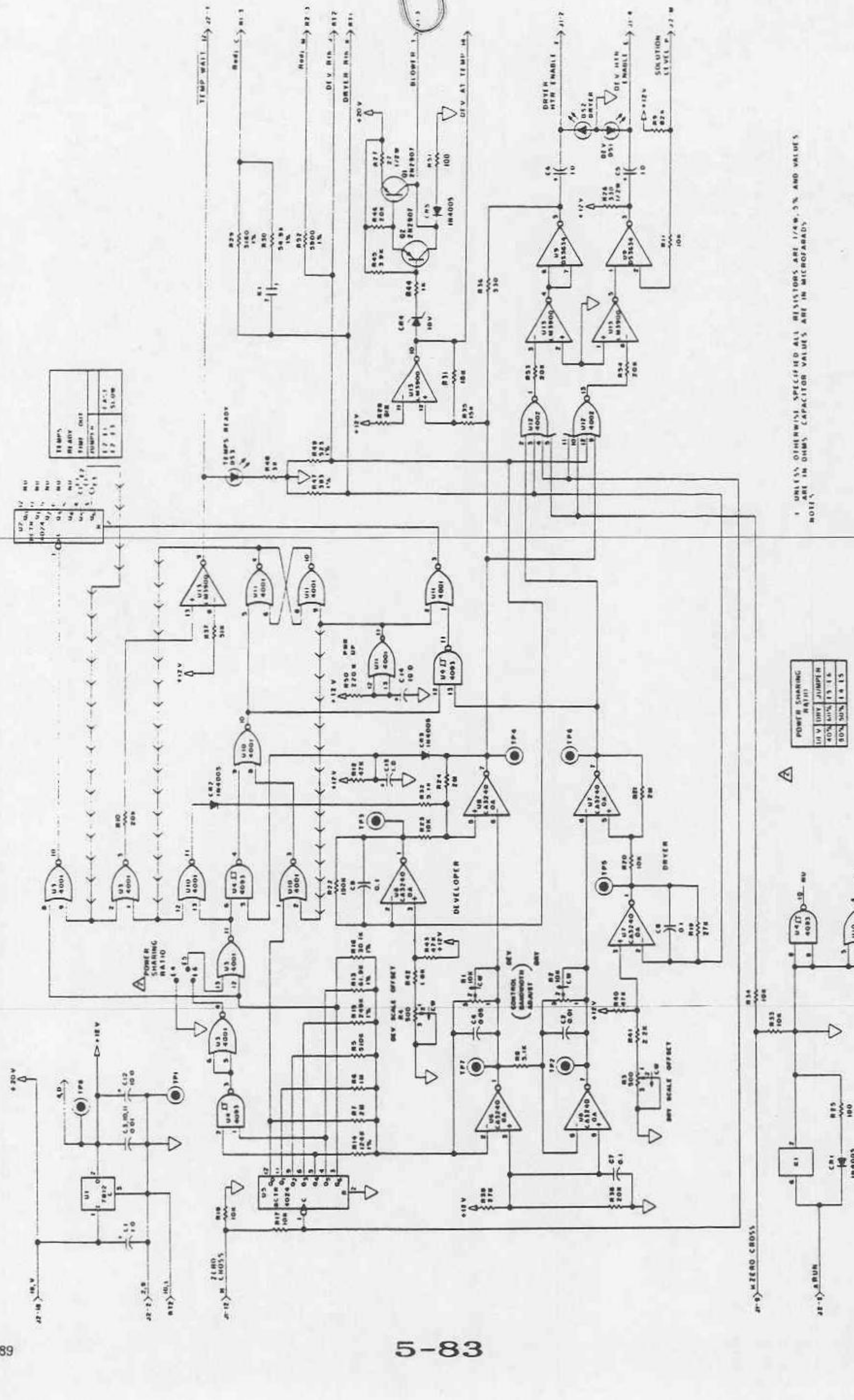

TEMP WAIT
DEV AT TEMP
BLOWER
DRYER HTR ENABLE
DEV HTR ENABLE
SOLUTION LEVEL
TEMPS READY
DEVELOPER
DRYER
CONTROL BANDWIDTH ADJUST
DEV SCALE OFFSET
DRY SCALE OFFSET
POWER SHARING RATIO
ZERO CROSS
RUN
NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W, 5% AND VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS

Figure 5-40, Temperature Control Board

Notes:

Section 6

Parts

AFP 14X-3
X-Ray Processor

Illustrated Parts Breakdown

The following pages contain an illustrated parts breakdown for the ***AFP 14X-3*** processor.

Application

This listing includes parts for the following versions of the processor:

Version	**FSN**	**AFP p/n**
U.S. Air Force	6525-01-162-8249	999-200-1400
U.S. Army	6525-01-220-5079	999-200-1300

Unless otherwise indicated, all illustrated parts will interchange on either of the above listed versions of the ***AFP 14X-3*** processor.

How Parts Are Listed

The parts section is broken into 30 different figures. Each of the figures, such as Figure 1, Main Assembly, may be illustrated over a number of sheets.

Following the last sheet of a given figure is the part descriptions and part numbers. To locate a part number or a part description, use the figure number and the "Bubbled" indicator number to find the correct line entry in the parts listings.

Example:

Figure 1, sheet 3, Item 134, is listed as item 134 on the Figure 1 parts listing page.

List of Figures

Figure 6- 1, General Assembly 6- 3
Figure 6- 2, Electrical Panel 6-14
Figure 6- 3, Replenisher Switch 6-16
Figure 6- 4, Transfer Shaft 6-17
Figure 6- 5, Drive Shaft 6-18
Figure 6- 6, Detector 6-19
Figure 6- 7, Developer Rack 6-20
Figure 6- 8, Fix Rack 6-22
Figure 6- 9, Wash Rack 6-24
Figure 6-10, Crossover Assembly 6-26
Figure 6-11, Dryer Front 6-27
Figure 6-12, Dryer Rack 6-28
Figure 6-13, Stripping Roller Final Assy 6-31
Figure 6-14, Stripping Roller 6-31
Figure 6-15, Dryer Roller 6-32
Figure 6-16, Dryer Roller 6-32
Figure 6-17, Dryer Roller 6-33
Figure 6-18, Dryer Roller No. 4 6-33
Figure 6-19, Dryer, Rear 6-34
Figure 6-20, Plumbing Layout 6-35
Figure 6-21, Drain Manifold 6-37
Figure 6-22, Heat Tube 6-38
Figure 6-23, Replenisher Pump 6-39
Figure 6-24, Circulation Pump 6-41
Figure 6-25, Daylight Loading Assy 6-42
Figure 6-26, Replenisher Tank Group 6-43
Figure 6-27, Power Control Board 6-44
Figure 6-28, Timing Control Board 6-46
Figure 6-29, Temperature Control Board 6-48

Notes:

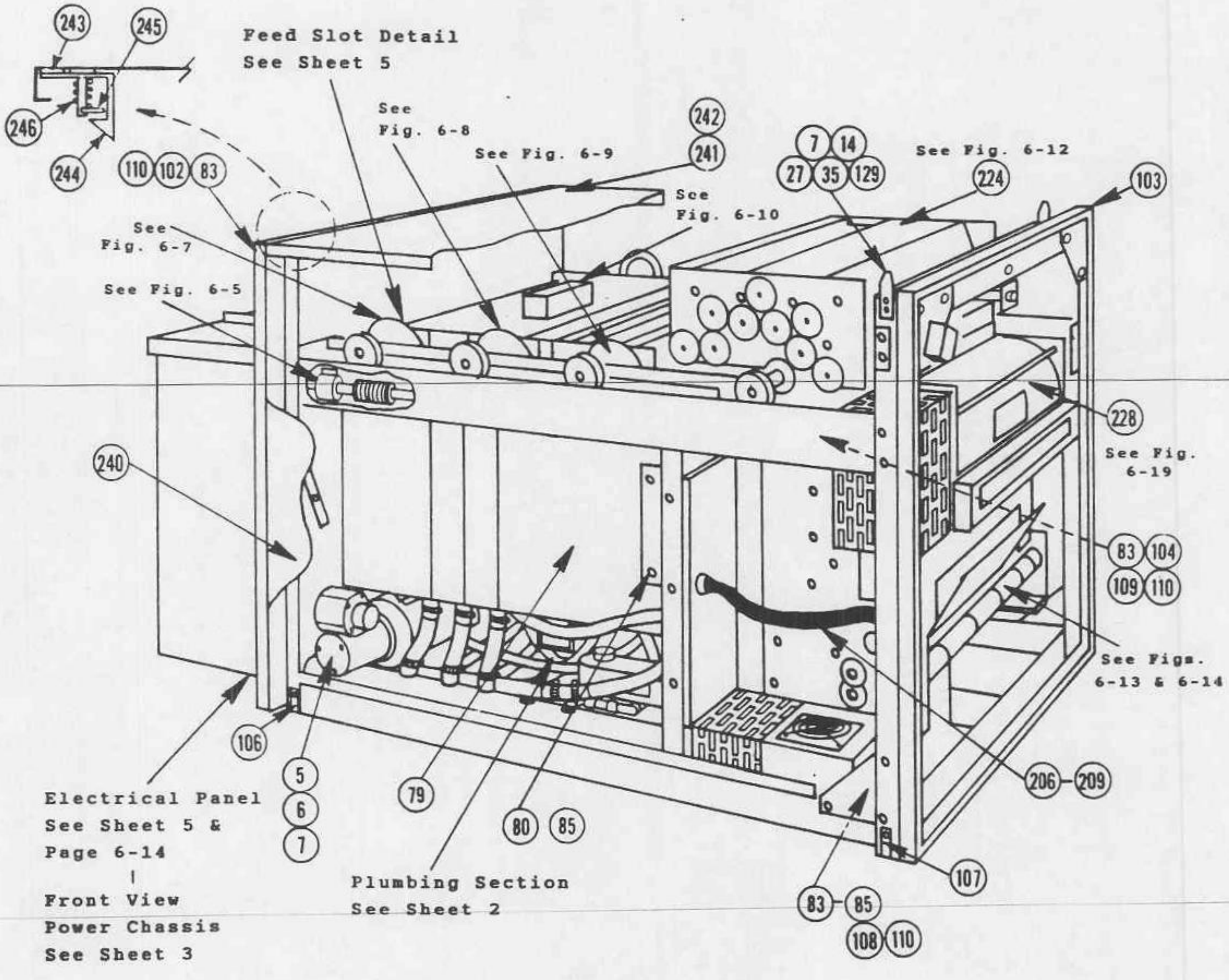
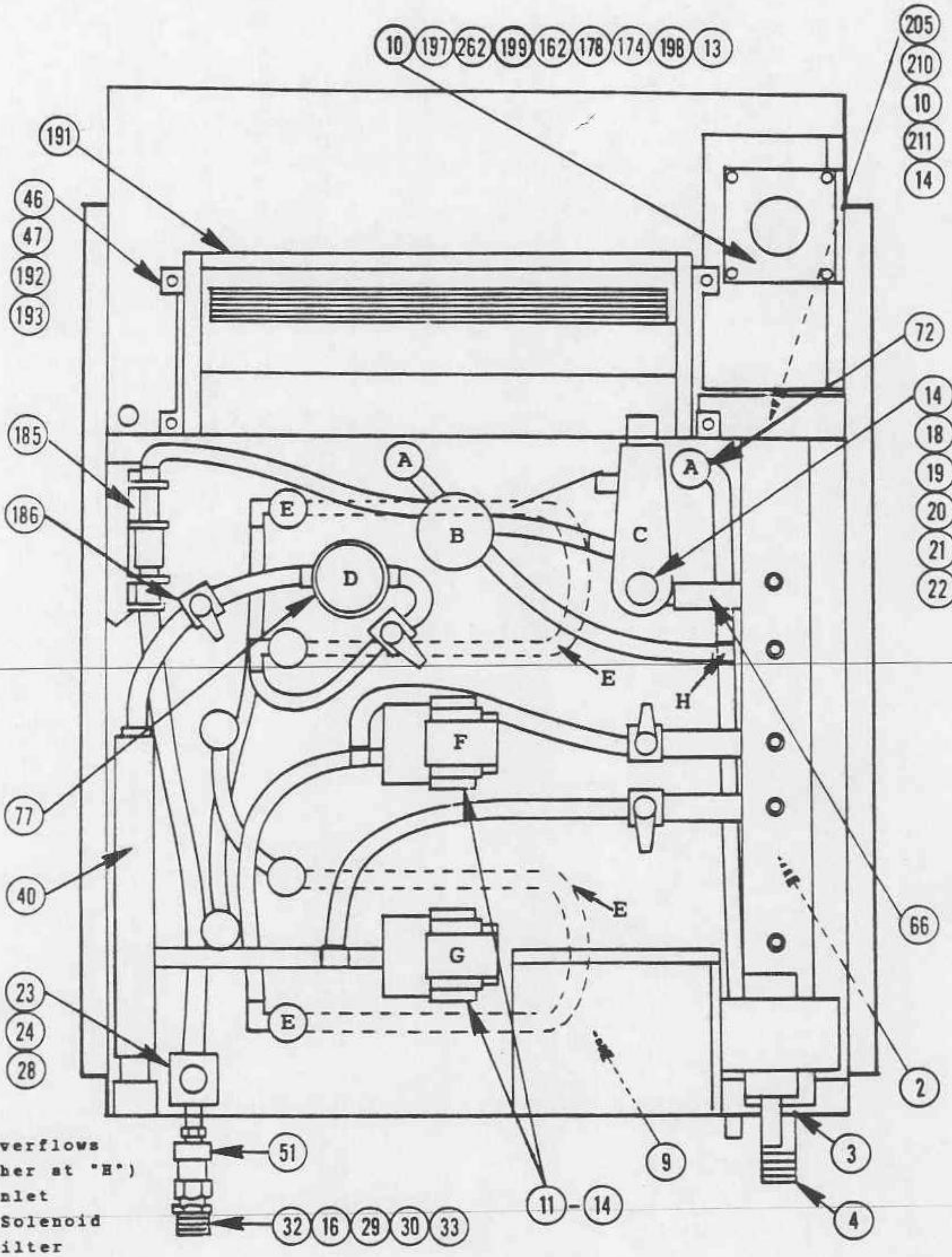

243
245
246
244
Feed Slot Detail
See Sheet 5
See
Fig. 6-8
See Fig. 6-9
242
241
7
14
27
35
129
See Fig. 6-12
224
103
110
102
83
See
Fig. 6-7
See
Fig. 6-10
See Fig. 6-5
228
See Fig.
6-19
240
83
104
109
110
See Figs.
6-13 & 6-14
106
5
6
7
79
80
85
206-209
Electrical Panel
See Sheet 5 &
Page 6-14
Front View
Power Chassis
See Sheet 3
Plumbing Section
See Sheet 2
107
83-85
108
110

Figure 6-1, General Assembly, Sheet 1 of 5

(Overall View)


10
197
262
199
162
178
174
198
13
205
210
10
211
14
191
46
47
192
193
72
14
18
19
20
21
22
185
A
A
E
B
C
186
D
E
H
F
77
40
E
G
66
23
24
28
E
9
2
3
51
11-14
4
32
16
29
30
33

A = Wash Tank Overflows
(tied together at "H")
B = Wash Tank Inlet
C = Wash Drain Solenoid
D = Developer Filter
E = Heat Exchangers
F = Fixer Pump
G = Developer Pump
H = Tee for Wash Tank
Overflows

Figure 6-1, General Assembly, Sheet 2 of 5

(Plumbing Cross Section)

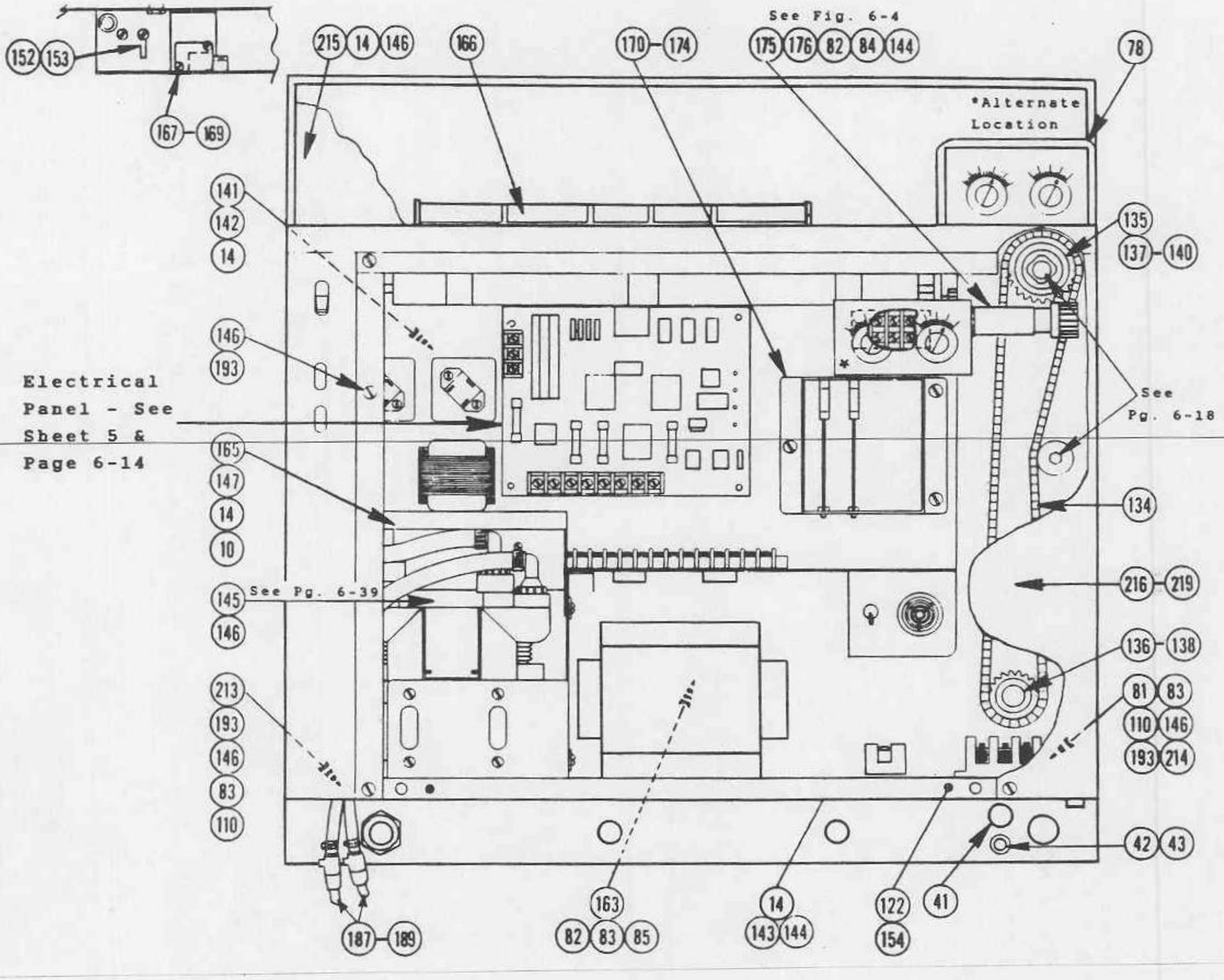

See Fig. 6-4
152 153
215 14 146
166
170-174
175 176 82 84 144
78
*Alternate Location
167-169
141
142
14
146
193
Electrical Panel - See Sheet 5 & Page 6-14
165
147
14
10
145 See Pg. 6-39
146
213
193
146
83
110
*
135
137-140
See Pg. 6-18
134
216-219
136-138
81 83
110 146
193 214
42 43
187-189
163
82 83 85
14
143 144
122
154
41

Figure 6-1, General Assembly, Sheet 3 of 5

(Front View, Power Chassis Area)

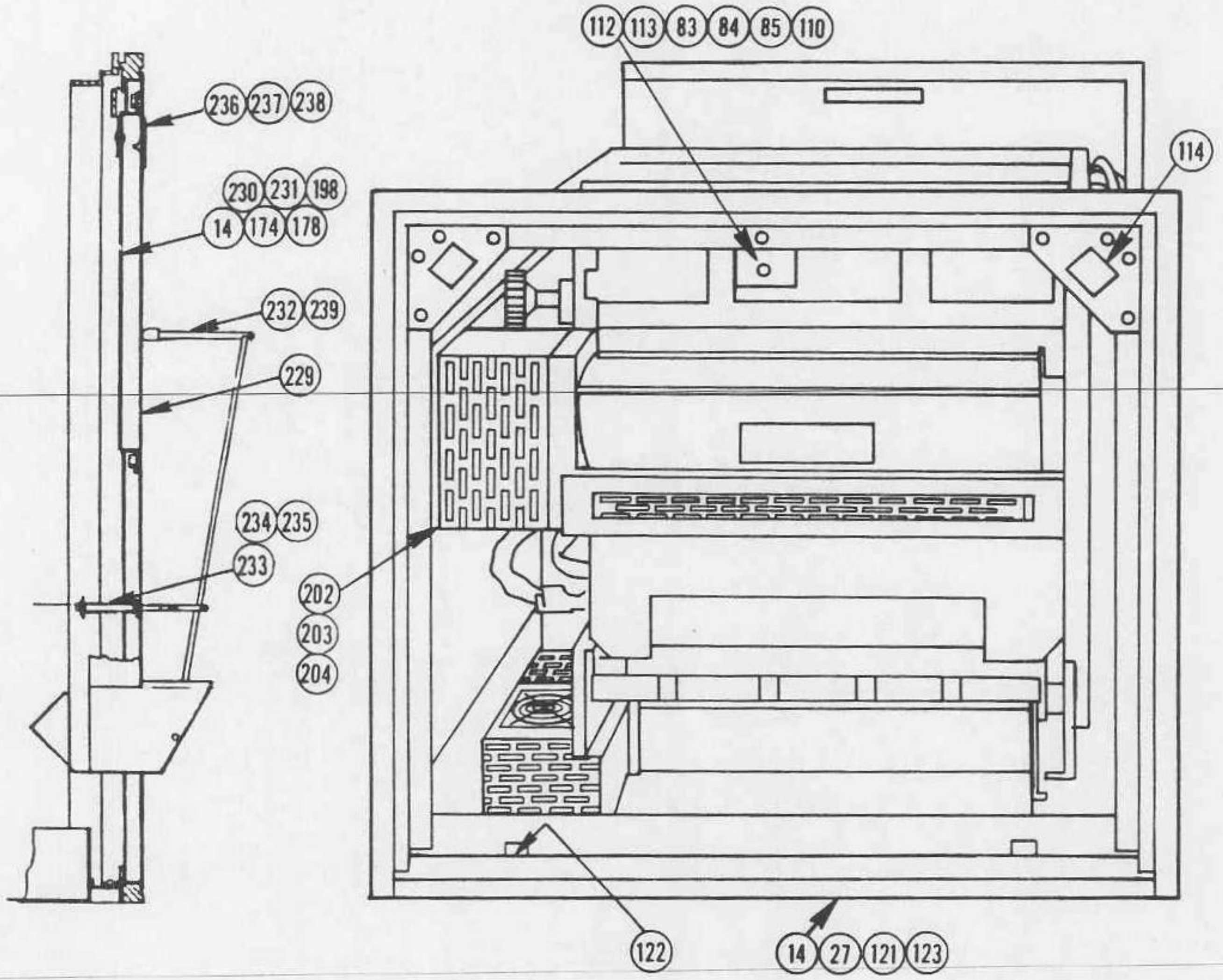
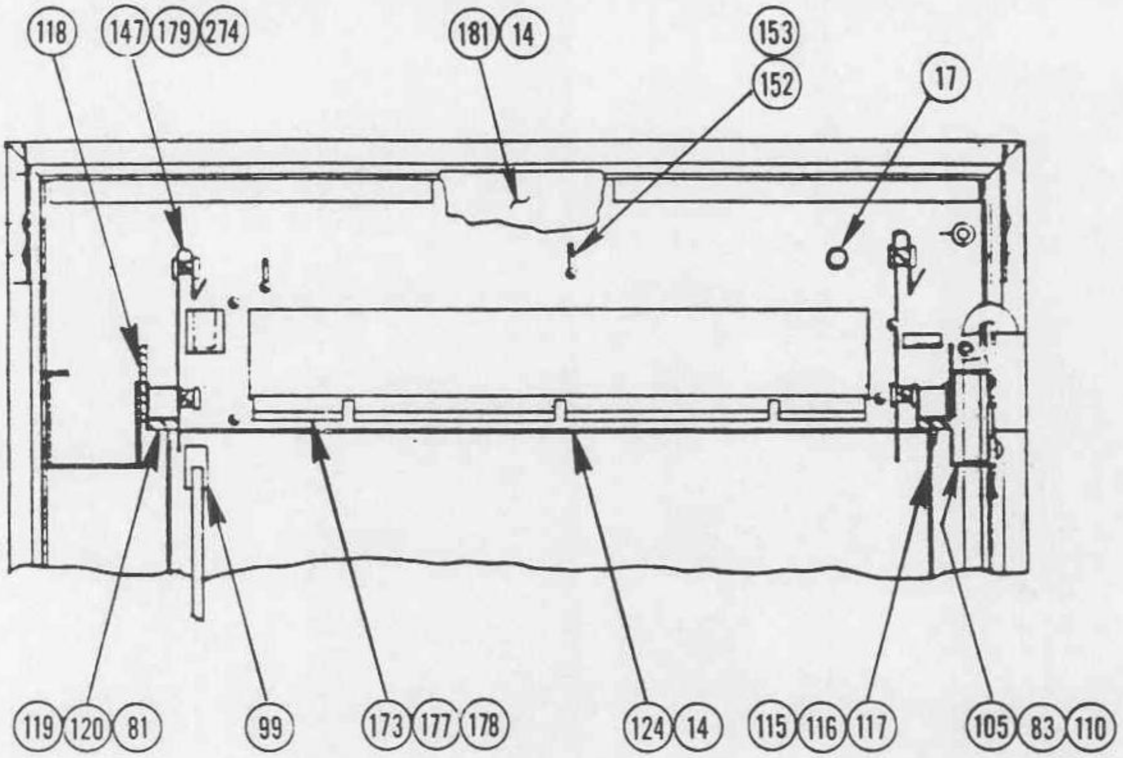
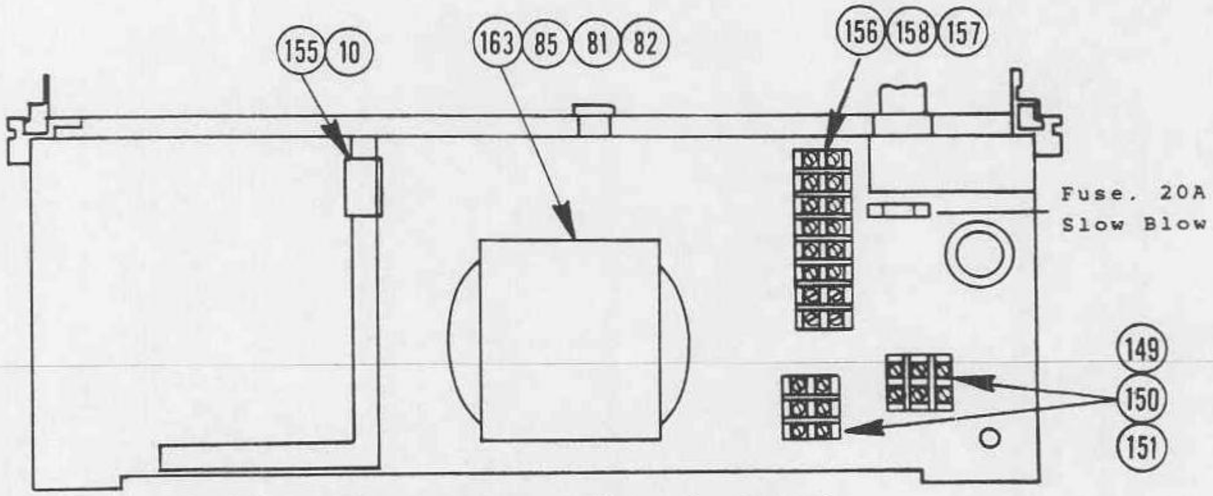

112
113
83
84
85
110
236
237
238
114
230
231
198
14
174
178
232
239
229
234
235
233
202
203
204
122
14
27
121
123

Figure 6-1, General Assembly, Sheet 4 of 5

(Rear View & Back Panel)


118
147
179
274
181
14
153
152
17
119
120
81
99
173
177
178
124
14
115
116
117
105
83
110

(Feed Slot Detail)


155
10
163
85
81
82
156
158
157
Fuse. 20A
Slow Blow
149
150
151

(Bottom View - Power Chassis Area)

Figure 7-1, General Assembly, Sheet 5 of 5

Parts

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-1	AFP 14X-3	GENERAL ASSEMBLY, PROCESSOR	
6-1-1	575-10009	CHASSIS WELDMENT	1
2	575-10012	MANIFOLD ASSY, Drain	1
3	98390	GROMMET	1
4	86488	NIPPLE	1
5	90434	MOTOR, Drive	1
6	1008-AG-H	SCREW, Hex, 10-32x.500 SST	4
7	9400-AF-H	WASHER, Spg. Lock, #10, SST	20
8	30513	BUSHING, Hole, Snap	1
9	525-430	GUARD, Motor	1
10	89831	LABEL, Grounding	10
11	46311	PUMP ASSY	2
12	525-1263	BRACKET ASSY, Pump, Fix	2
13	706-BG-H	SCREW, TH, 6-32 x .375, SST	8
14	906-BG-H	SCREW, TH, 10-24 x .375, SST	44
15	908-BG-H	SCREW, TH, 10-24 x .500, SST	
16	87376	NIPPLE, Pipe, .375 MPT x GHT	1
17	30510	BUSHING, Snap	4
18	92149	SOLENOID	1
19	9400-AC-H	WASHER, .196 x .593 x .032, SST	7
20	83803	ELBOW, 1/2 BRB x 1/4 MPT	2
~~21~~	~~575-7023~~	~~NIPPLE, Solenoid~~	~~1~~
22	6000-BK-Y	NUT, Lock, Conduit	2
23	91905	SOLENOID, Fill	1
24	568-4020	BRACKET, Solenoid, Water	1
25	804-BB-H	SCREW, Hex, 8-32 x .250, STL (GRD)	1
26	9300-AD-H	WASHER, INT.T., #8, STL. (GRD)	1
27	9400-AA-H	WASHER, Flat, .200x.437x.037, SST	16
28	83553	FITTING, .500 BRB x .250 MPT	1
29	91263	BUSHING, .375 MPT x .250 FPT	1
30	87377	CONTROL, Flow, 3/4 GPM	1
31	84150	SEALANT, Silicone	A/R
32	80503	NIPPLE, Pipe, .375 BRS	
33	80481	NIPPLE, Pipe, .250 NPT x 1.500, BRS	1
34	575-4008	BRACKET, Exchanger, Heat	2
35	5200-AA-H	NUT, Hex, 10-24, SST	12
36	575-10011	EXCHANGER ASSY, Heat	1
37	525-1136	EXCHANGER ASSY, Heat, Fix	1
38	575-4009	CLAMP, Exchanger, Heat	2
39	906-BH-H	SCREW, RH, 10-24 x .375, SST	4
40	575-10027	TUBE ASSY, Heat	1
41	30525	BUSHING, Snap	1
42	84005	ADAPTER, .500 ID TUBE x .375 NPT	1
43	5700-AL-H	NUT, Speed, .375 NPT, STL	1
44	575-4034	COVER, Hole	1
45	8800-AF-H	O-RING	1
46	9300-AB-H	WASHER, .172 x .375 x .031, SST	8
47	5000-AA-H	NUT, Hex, 8-32, SST	9
48-49	Not Used		

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-1	AFP 14X-3	GENERAL ASSEMBLY, PROCESSOR, Continued	
50-53	Not Used		
54	575-7008	TUBING, Formed	1
55	92188	ELBOW	1
56	575-7013	TUBING, Formed	1
57-71	Not Used		
72	575-7011	TUBING, Formed	1
73	575-4019	PLATE, Switch	1
74	46285-C	TEE, BRB, .500 x .500	5
75	31-7019	TEE	1
76	76-763	REDUCER, Tube	2
77	575-10067	FILTER	1
78	575-7045	COVER, Control Knobs	1
79	799-1064	TANK ASSY, Molded, 14x3 mil.	1
80	525-513	ANGLE, Tank	2
81	1106-AG-H	SCREW, Hex, 1/4-20 x .375, SST	8
82	10604-AK-H	WASHER, Flat, 1/4, SST	18
83	1108-AG-H	SCREW, Hex, 1/4-20 x .500, SST	37
84	9500-AF-H	WASHER, Spg. Lock, 1/4, SST	24
85	5400-AA-H	NUT, Hex, 1/4-20, SST	15
86	503-726	ADAPTOR, Sensor	1
87	45822	O-RING	1
88	80-234	WASHER, Packing	1
89	80-726	NUT, Packing	1
90	528-146	FITTING, Drain	3
91	525-1156	FITTING ASSY, Circulation	2
92	525-719	SEAL, Tank	1
93	528-727	GASKET, Round	6
94	806-BG-H	SCREW, T HD, 8-32 x .375, SST	24
95	41406	CLAMP, Hose [2]	44
96	41407	CLAMP, Hose [2]	3
97	41405	CLAMP, Hose [2]	18
98	86031	PLUG, Pipe	2
99	98-51-020	TUBING, Level Limiter	2
100	48280	SPACER, Tank	2
101	910-AG-H	SCREW, Hex, 10-24 x .625, SST	2
102	575-2008	TRIM, Front	1
103	525-2004	TRIM, Rear	1
104	525-1020	RAIL ASSY, Right	1
105	525-1021	RAIL WELDMENT, Left	1
106	525-569	HOOK, Right, Panel	2
107	525-570	HOOK, Left, Panel	2
108	525-4020	GUSSET	4
109	1108-BG-H	SCREW, TH, 1/4 x .500, SST	5

NOTE: [1] = PARTS SHIPPED LOOSE; [2] = PARTS NOT ILLUSTRATED

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-1	AFP 14X-3	GENERAL ASSEMBLY, PROCESSOR, Continued	
110	000-10600-AA-H	WASHER, Flat, 1/4, SST	33
111	20490	FLOW RESTRICTOR, 1/4 GPM	1
112	525-4076	PLATE, Latch	1
113	88414	FASTENER, Turn, Quarter	1
114	99-34-010	TAPE, Foam	2
115	550-598	CAP, Tank, Left	1
116	99-09-180	TAPE, Foam	1
117	98-54-192	TAPE, Dortite	1
118	525-428	DETENT, Right	1
119	550-597	CAP, Tank, Right	1
120	98-54-184	TAPE, Dortite	1
121	525-2001	TRIM, Lower	1
122	000-00704-AT-H	SCREW, Soc, 6-32 x .250	4
123	000-00716-AZ-H	SCREW, FH, 6-32 x 1.000, SST	2
124	525-1017	CAP ASSY, Drip	1
125	550-129	SHAFT ASSY, Drive	1
126	83762	BEARING	1
127	000-09600-AF-H	WASHER, Spg. Lock, 5/16, SST	2
128	000-05600-AA-H	NUT, Hex, 5/16-18, SST	2
129	525-568	HOOK, Panel, Upper	4
~~130~~	~~525-219~~	~~POST, Idler~~	~~1~~
131	525-7003	SPOOL	1
132	525-104	NUT ASSY, Idler	1
133	000-01120-AG-H	SCREW, Hex, 1/4-20 x 1.250, SST	1
134	525-268	CHAIN, Drive	1
135	76-274	SPROCKET, Drive	1
136	80-227	SPROCKET, Reducer	1
137	82129	KEY, Woodruff	1
138	000-00904-AS-H	SCREW, Set, 10-24 x .250, SST	2
139	504-703	WORM, Drive	1
140	000-15512-AD-H	PIN, Spiral	1
141	575-10036	PANEL ASSY, Electrical	1
142	000-00912-BG-H	SCREW, TH, 10-24 x .750, SST	4
143	575-10063	SHELF WELDMENT	1
144	000-01112-AG-H	SCREW, Hex, 1/4-20 x .750, SST	4
145	87366	PUMP, Replenisher	1
146	000-00804-BG-H	SCREW, TH, 8-32 x .250, SST	20
147	90596	CLAMP, Terminal	8
148	87095	LUG, Terminal	1
149	89871	END, Strip, Terminal	1
150	89872	SECTION, Strip, Terminal	3
151	000-00806-BH-H	SCREW, RH, 8-32 x .375, SST	2
152	89019	TIE, Cable	6
153	000-00708-BG-H	SCREW, TH, 6-32 x .500, SST	8
154	000-00812-BJ-H	SCREW, PH HD, 8-32 x .750, w/Washer	2
155	30524	BUSHING, Snap, 1.375	1

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-1	AFP 14X-3	GENERAL ASSEMBLY, PROCESSOR, Continued	
156	88981	STRIP, Terminal (8)	2
157	710-BH-H	SCREW, RH, 6-32 x .625, SST	4
158	81993	STRIP, Marker (8)	2
159	91564	CORD, Power	1
160	80076	CONNECTOR, Cord	2
161	90325	FILTER	1
162	710-BG-H	SCREW, TH, 6-32 x .625, SST	5
163	38082	TRANSFORMER	1
164	5400-AK-G	NUT, Speed, 1/4-20	4
165	575-4017	COVER, Head, Pump	1
166	575-10000	DETECTOR ASSY	1
167	575-7003	INSULATOR, Microswitch	1
168	514-BH-H	SCREW, RH, 4-40 x .875, SST	2
169	575-4042	PLATE, Nut, Switch	1
170	568-1702	PC ASSY, Control, Temp.	1
171	575-1704	PC ASSY, Control, Timing	1
172	575-4028	COVER, Cage, Card	1
173	704-BG-H	SCREW, TH, 6-32 x .250, SST	5
174	9200-AF-H	WASHER, Spg. Lock, #6, SST	11
175	575-10021	SHAFT ASSY, Transfer	1
176	575-4001	SPACER, Shaft, Transfer (See Fig.6-4)	1
177	575-4022	GUIDE, Entrance, Film	1
178	9200-AB-H	WASHER, Flat, .147x.375x.032, SST	12
179	575-10033	SENSOR ASSY, Level	2
180	88339	SENSOR, Temp, Dev	1
181	525-4307	COVER, Detector	1
182	525-274	HOOK, Replenisher	2
183	568-4024	POT. BRACKET, w/Calibrated Screen	1
184	91642	POTENTIOMETER, R1, R2	2
185	20995-1	PUMP ASSY, Osc., w/Spring, 220V	1
186	49004	VALVE, Ball, 1/2x1/2, Barb	2
187	Not Used		
188	Not Used		
189	46220-H	COUPLING	2
190	9530062650	TUBING, Reinforced, 1/2 ID	2
191	525-1191	BLOWER ASSY, Tangential	1
192	550-541	STRAP, BLOWER	2
193	9300-AF-H	WASHER, Spg. Lock, #8, SST	19
194	9016060320	SPAGHETTI	1
195	30526-A	BUSHING, Relief, Strain	2
196	575-10047	WIRE ASSY	1
197	87359	FAN	1
198	5000-AA-H	NUT, Hex, 6-32, SST	13
199	87379	GUARD, Finger	1
200	575-10025	DRYER ASSY, Front	1

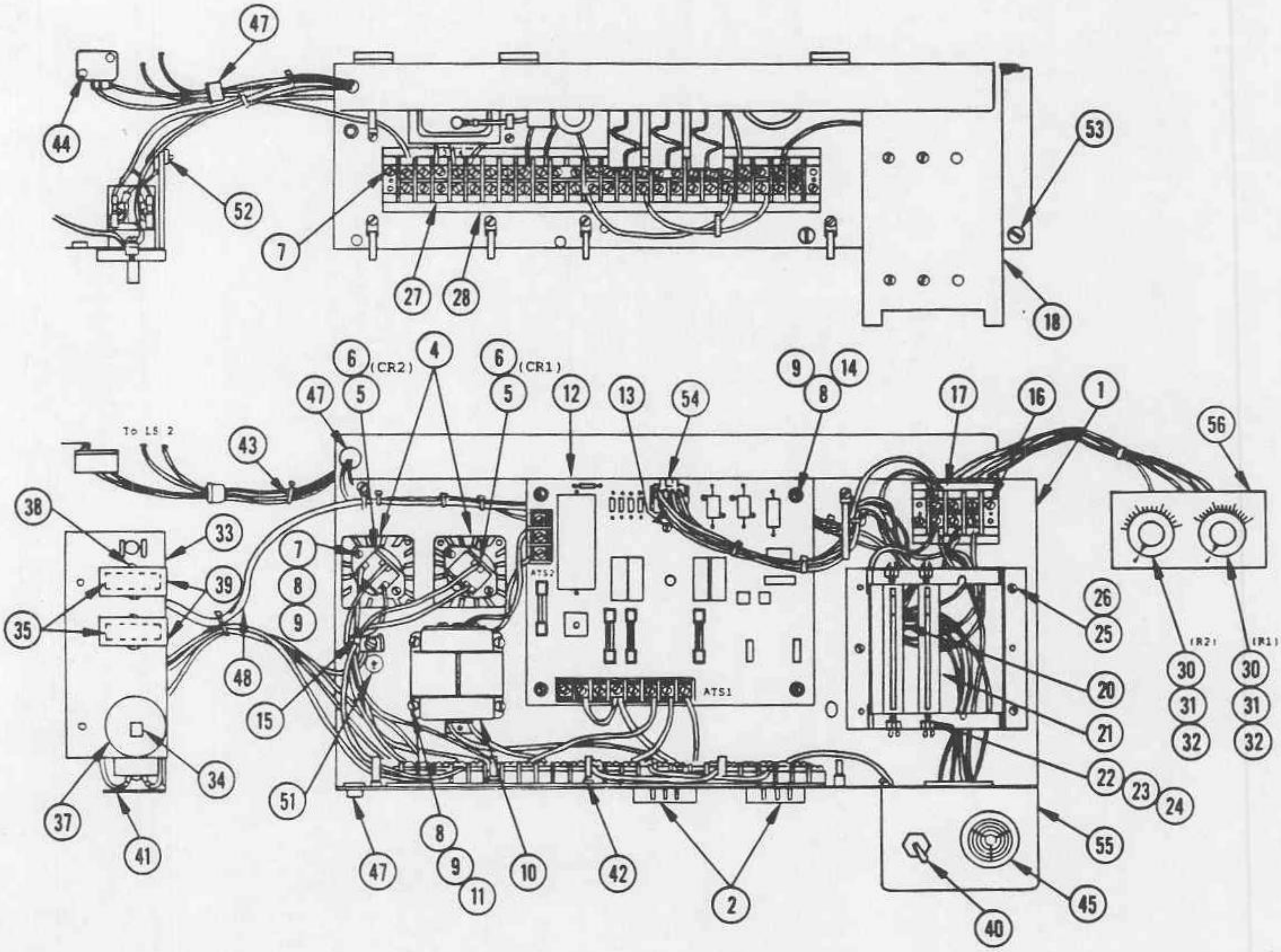

47
44
52
7
27
28
53
18
6
(CR2)
4
6
(CR1)
9
14
8
47
5
5
12
13
54
17
16
1
56
To LS 2
43
38
33
7
8
9
39
35
48
ATS2
ATS1
15
26
25
20
21
(R2)
(R1)
30
31
32
30
31
32
22
23
24
34
37
41
51
47
8
9
11
10
42
2
55
40
45

Figure 6-2, Electrical Panel

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-2		ELECTRICAL PANEL, PROCESSOR	
6-2- 1	575-10003	PANEL WELDMENT, Component	1
2	31518	BUSHING, Snap (1.500)	2
3	30513	BUSHING, Snap (.875)	1
4	89205	SINK, Heat	2
5	00105002506	TRIAC, CR1, CR2	2
6	91416	PAD, Thermal	2
7	710-BH-H	SCREW, RH, 6-32 x .625, SST	21
8	9200-AB-H	WASHER, Flat, #6, SST	13
9	9200-AF-H	WASHER, Spg. Lock, #6, SST	13
10	92161	TRANSFORMER (12), T2	1
11	704-BG-H	SCREW, RH, 6-32 x .250, SST	4
12	575-1700	PC ASSY, Power (AJ1)	1
13	712-BH-R	SCREW, RH, 6-32 x .750, Nylon	1
14	712-BH-H	SCREW, TH, 6-32 x .750, SST	5
15	90596	CLAMP, Terminal	3
16	87383	STRIP, Terminal (3), TS5	1
17	83059	STRIP, Marker (3)	1
18	575-10002	CAGE WELDMENT, Card	1
19	86388	GUIDE, Card	4
20	568-1048	CONNECTOR ASSY, Circuit, J2	1
21	568-1049	CONNECTOR ASSY, Circuit, J3	1
22	510-BH-H	SCREW, RH, 4-40 x .625, SST	4
23	9000-AD-H	WASHER, Spg. Lock, #4, SST	4
24	4800-AA-H	NUT, Hex, 4-40, SST	4
25	804-BH-H	SCREW, RH, 8-32 x .250, SST	3
26	9300-AF-H	WASHER, Spg. Lock, #8, SST	3
27	87096	STRIP, Terminal (24), TS6	1
28	88005	STRIP, Marker (24)	1
29	Not Used		
30	91642	POTENTIOMETER, R1, R2	2
31	90319	KNOB	2
32	88-746	POT., Insulator	2
33	575-4019	PANEL, Switch	1
34	90820	SWITCH, S1	1
35	568-1045	LIGHT ASSY, DS2	1
36	Not Used		
37	525-7036	BAFFLE, Switch	1
38	88382	NUT, Push	4
39	88381	LENS, Light	2
40	37296	SWITCH, CH7585K6	1
41	575-7000	INSULATOR, Light	1
42	89019	TIE, Cable	12
43	81691	TIE, Cable	A/R
44	575-10032	SWITCH ASSY, Detector, LS1	1
45	84391	SONALERT, BU1	1
46	37296	SWITCH	1
47	30510	BUSHING, Snap (.500)	3
48	575-10046	WIRE ASSY	1

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-2		ELECTRICAL PANEL, PROCESSOR, Continued	
49	Not Used		
50	Not Used		
51	89831	LABEL, Grounding	3
52	706-BG-H	SCREW, T HD, 6-32 x .375, SST	12
53	906-BG-H	SCREW, T HD, 10-24 x .375, SST	2
54	91530	CONNECTOR, MR II, AP1	1
55	575-4019	PLATE, Switch	1
56	568-4024	POT. BRACKET, w/Calibrated Screen	1

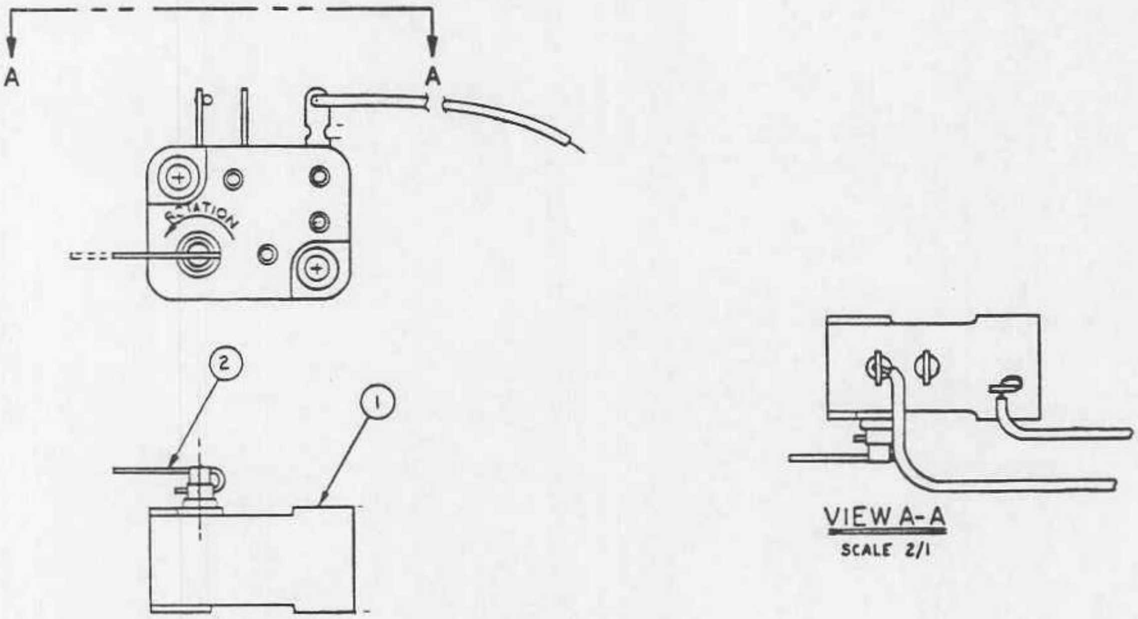


Figure 6-3, Replenisher Switch

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-3	575-10032	REPLENISHER SWITCH	1
6-3- 1	87089	SWITCH	1
2	525-202	ACTUATOR, Repl. Switch	1
3	575-16510	LIST, Wire	1

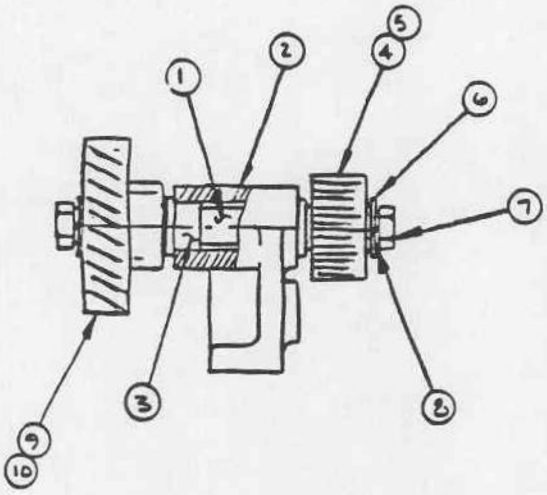


Figure 6-4, Transfer Shaft

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-4		TRANSFER SHAFT	
6-4- 1	550-210	SHAFT, TRANSFER, .375 Dia., SST	1
2	550-205	SUPPORT, Bearing	1
3	550-783	BEARING	2
4	568-7009	GEAR, Idler	1
5	000-15410-AC-H	PIN, Groove, .125 Dia. x .625, SST	1
6	000-09400-AC-H	WASHER, Flat, #10, SST	2
7	000-00906-AG-H	SCREW, Hex, 10-24 x .375, SST	2
8	000-09400-AF-H	WASHER, Spg. Lock, #10, SST	2
9	525-706	GEAR, Rack Worm	1
10	000-15512-AC-H	PIN, Groove, .156 Dia. x .750, SST	1

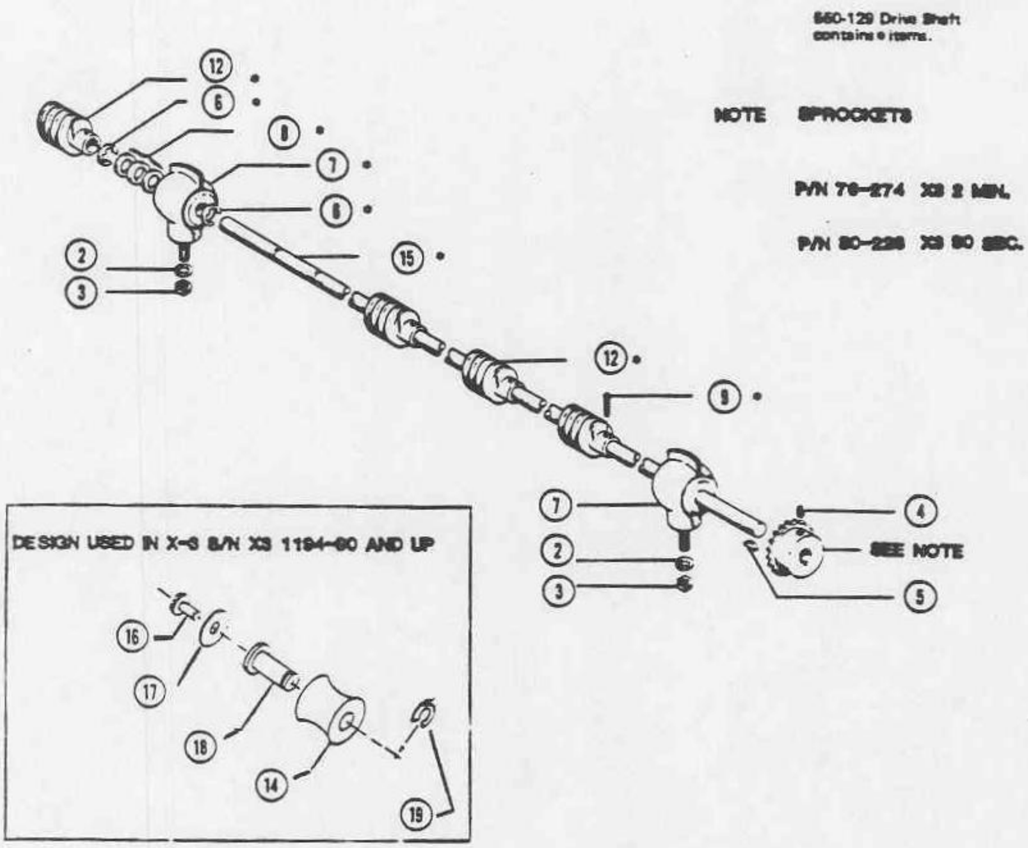

550-129 Drive Shaft
contains • items.
NOTE SPROCKETS
P/N 76-274 X3 2 MIN.
P/N 80-228 X3 80 SEC.
12
6
8
7
6
15
2
3
12
9
7
2
3
4
SEE NOTE
5
DESIGN USED IN X-3 S/N X3 1194-80 AND UP
16
17
18
14
19

Figure 6-5, Drive Shaft

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-5	550-129	SHAFT ASSY, DRIVE, Contains * Items	1
6-5- 1	000-10600-AA-H	WASHER, 17/64x1/2x.062 (7x13x2mm)	1
2	000-09600-AF-H	WASHER, Lock, 5/16 (8mm)	2
3	000-05600-AA-H	NUT, Hex, 5/16-18	2
4	000-00904-AS-H	SCREW, Set, 10-24x1/4 (6mm)	1
5	82129	KEY, Woodruff, #2	1
6	47134-PH*	RING, Retaining, 1/2 (12mm)	2
7	83762 *	BEARING, Clam Shell, 1/2 (13mm) Bore	2
8	83764 *	BEARING, Thrust, 1/2x15/16x1/4 (13x24x6mm)	3
9	000-15512-AD-H *	PIN, 5/32x3/4 (4x19mm)	1
10	000-01120-AG-H	SCREW, Hex Hd, 1/4-20x1-1/4 (3.1cm)	1
11	86-218	SPROCKET	1
12	504-703 *	GEAR	2
13	525-219	POST, Idler	1
14	525-7003	SPOOL, Tension	1
15	550-209 *	SHAFT, Drive	1
16	000-00908-BG-H	SCREW	1
17	000-09600-AB-H	WASHER	1
18	525-243	IDLER POST	1
19	568-7004-1	RETAINING CLIP	1

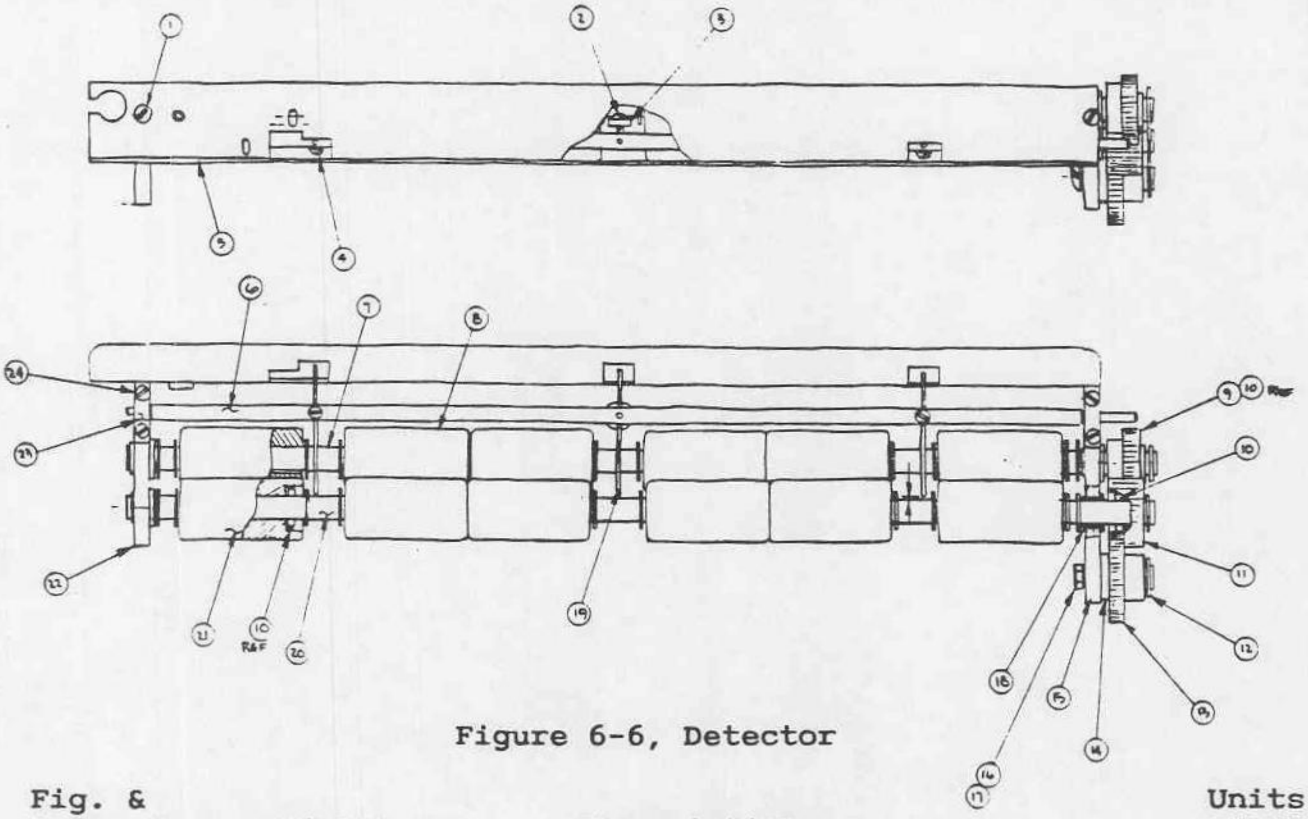


Figure 6-6, Detector

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-6	575-10000	DETECTOR	1
6-6- 1	000-00704-BG-H	SCREW, THD, 6-32 x .250, SST	2
2	000-00506-BG-H	SCREW, RD HD, 4-40 x .375, SST	1
3	525-200	COUNTERWEIGHT, Detector	1
4	000-00503-BH-H	SCREW, RD HD, 4-40 x .187, SST	2
5	575-4041	TRAY, Microswitch	1
6	525-255	ROD, Detector	1
7	575-2000	SHAFT, Segment Roller	1
8	568-7005	SEGMENT, Roller	6
9	550-741	GEAR, Detector, Roller	1
10	000-15410-AC-H	PIN, Groove, .125 x .625, SST	8
11	568-7009	GEAR, Idler	1
12	568-7004-1	RING, Retaining	23
13	504-711	GEAR	1
14	525-243	POST	1
15	575-2003	PLATE, Feed, Roller, Left	1
16	000-01008-AG-H	SCREW, H HD. 10-32 x .500, SST	1
17	000-09400-AF-H	WASHER, Spg. Lock, #10, SST	1
18	550-783	BEARING	4
19	525-503	FINGER, Detector	3
20	575-2001	SHAFT, Lower, Feed	1
21	575-7006	SEGMENT, Lower Roller	6
22	575-2002	PLATE, Feed Roller, Right	1
23	575-7004	BEARING, Detector	2
24	000-00710-BH-H	SCREW, RD HD, 6-32 x .625, SST	2

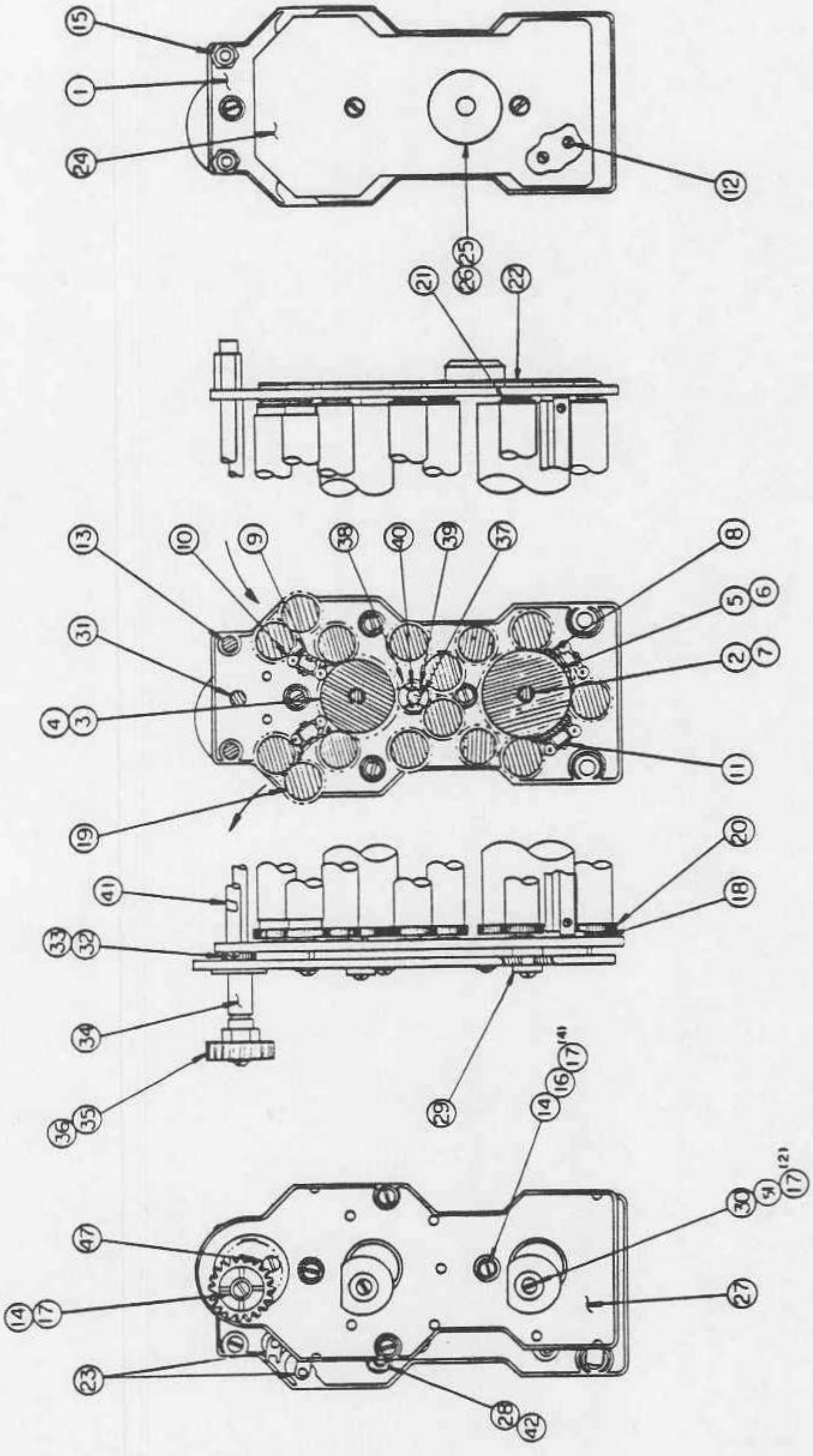

15
1
24
12
25
26
21
22
13
10
9
38
40
39
37
8
5
6
2
7
31
4
3
11
19
20
18
41
33
32
34
36
35
29
14
16
17 (4)
30
14
17 (2)
47
14
17
27
23
28
42

Figure 6-7, Developer Rack

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-7	575-10070	DEVELOPER RACK, PROCESSOR, MILITARY	1
6-7- 1	525-743	PLATE, STATIONARY	2
2	525-209	ROD, Tie	2
3	525-21	ROLLER ASSY, 2.0	1
4	525-783	GEAR, 2.0 Roller	1
5	525-22	ROLLER ASSY, 2.5	1
6	525-782	GEAR, 2.5 Roller	1
7	525-786	BEARING, Roller	4
8	525-29	SHOE ASSY, Rack, Lower	2
9	525-47	SHOE ASSY, Rack, Upper	2
10	504-789	BLOCK, Film Guide	8
11	000-00704-BG-H	SCREW, PAN HD, 6-32 x .250, SST	8
12	000-00712-BL-H	SCREW, PAN HD, 6-32 x .750, SST	16
13	525-229	ROD, Upper, Tie	2
14	000-00906-BG-H	SCREW, T HD, 10-24 x .375, SST	14
15	525-748	SUPPORT, Rack, Gear	2
16	525-204	PIN, Pivot	8
17	000-09400-AC-H	WASHER, .196 x .593 x .032, SST	12
17A	000-09400-AF-H	WASHER, #10, Split Lock	12
18	550-783	BEARING, Rack	34
19	568-1077	ROLLER, Rack w/Gear	15
20	Not Used		
21	Not Used		
22	550-759	PIN, Roller	15
23	550-758	CRANK, Roller	15
24	525-423	PLATE, Retainer	1
25	525-788	INLET, Rack	1
26	47134-JH	RING, Retaining	1
27	575-10045	PLATE ASSY, Moving	1
28	525-715	LINK, Pivot	4
29	550-754	RETAINER, Moving Plate	2
30	000-00920-BG-H	SCREW, T HD, 10-24 x 1.250, SST	2
31	525-232	SHAFT, Rack Drive	1
32	525-205	PIN, Drive Shaft	1
33	21353	GEAR, Rack Driven	1
34	525-747	SPACER, Support	1
35	000-15512-AC-H	PIN, Groove, .156 x .750, SST	1
36	525-706	GEAR, Rack Worm	1
37	525-83	SHAFT ASSY, Paddle	1
38	550-741	GEAR	1
39	525-486	PADDLE, Half	2
40	000-00702-BH-H	SCREW, RD HD, 6-32 x .125 SST	6
41	503-746	LABEL, CHEM DEVELOPER	A/R
42	40807	BEARING, Nyliner	8
	21583-1	SUPPORT BAR, DEV (Not Shown)	1

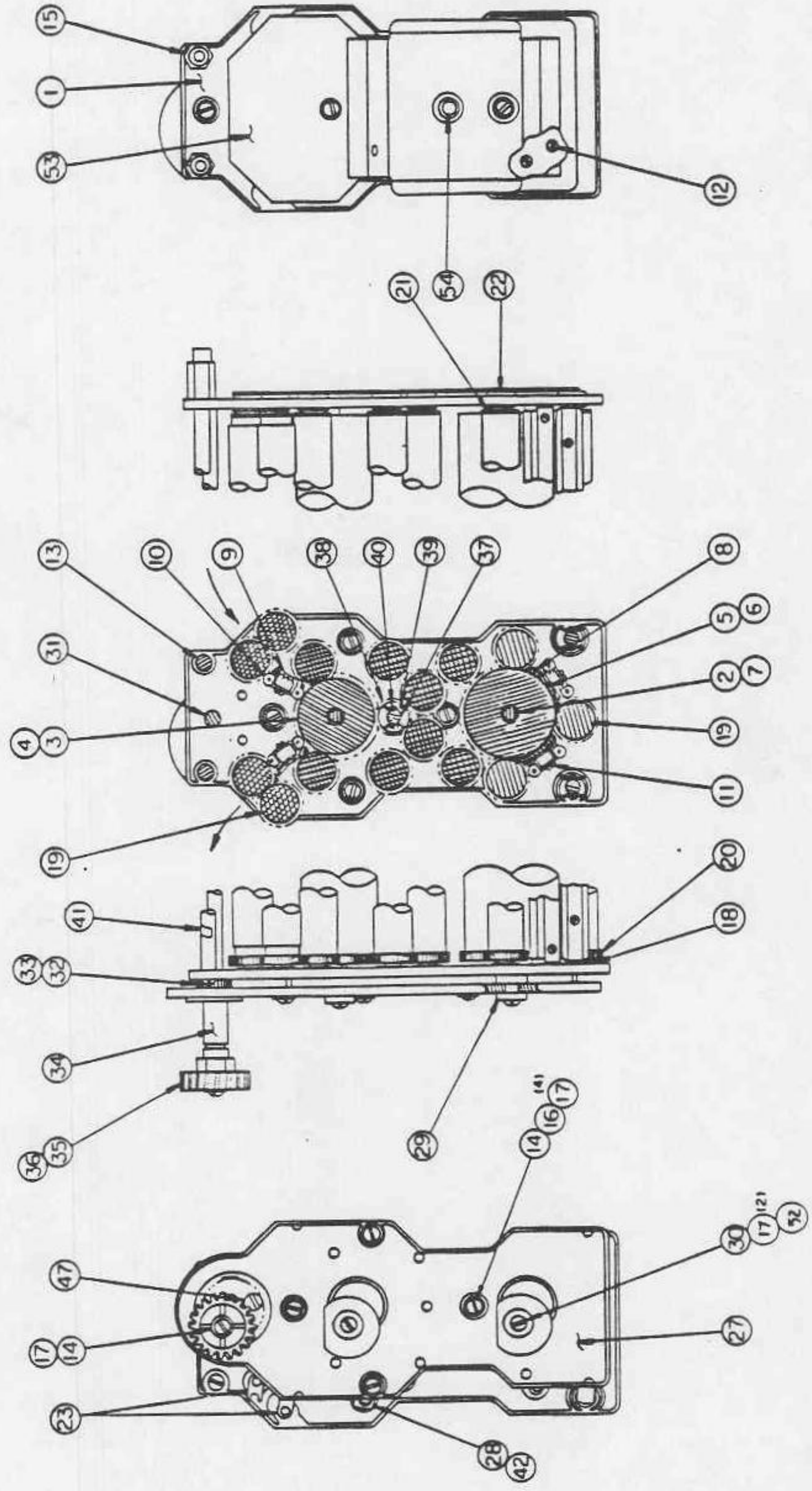

15
1
53
12
21
54
22
13
10
9
38
40
39
37
8
5
6
2
7
31
4
3
19
11
19
20
18
41
33
32
34
35
36
29
14
16
(4)
17
30
17 (2)
52
47
17
14
27
23
28
42

Figure 6-8, Fix Rack

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-8	575-10071	FIX RACK, PROCESSOR, MILITARY	1
6-8- 1	525-743	PLATE, STATIONARY	2
2	525-209	ROD, Tie	2
3	525-21	ROLLER ASSY, 2.0	1
4	525-783	GEAR, 2.0 Roller	1
5	525-22	ROLLER ASSY, 2.5	1
6	525-782	GEAR, 2.5 Roller	1
7	525-786	BEARING, Roller	4
8	525-29	SHOE ASSY, Rack, Lower	2
9	525-47	SHOE ASSY, Rack, Upper	2
10	504-789	BLOCK, Film Guide	8
11	000-00704-BG-H	SCREW, PAN HD, 6-32 x .250, SST	8
12	000-00712-BL-H	SCREW, PAN HD, 6-32 x .750, SST	16
13	525-229	ROD, Upper, Tie	2
14	000-00906-BG-H	SCREW, T HD, 10-24 x .375, SST	14
15	525-748	SUPPORT, Rack, Gear	2
16	525-204	PIN, Pivot	8
17	000-09400-AC-H	WASHER, .196 x .593 x .032, SST	10
18	550-783	BEARING, Rack	38
19	568-1077	ROLLER, Rack w/Gear	15
20	Not Used		
21	Not Used		
22	550-759	PIN, Roller	15
23	550-758	CRANK, Roller	15
24-26	Not Used		
27	575-10045	PLATE ASSY, Moving	1
28	525-715	LINK, Pivot	4
29	550-754	RETAINER, Moving Plate	2
30	000-00920-BG-H	SCREW, T HD, 10-24 x 1.250, SST	2
31	525-232	SHAFT, Rack Drive	1
32	525-205	PIN, Drive Shaft	1
33	21353	GEAR	1
34	525-747	SPACER, Support	1
35	000-15512-AC-H	PIN, Groove, .156 x .750, SST	1
36	525-706	GEAR, Rack Worm	1
37	525-83	SHAFT ASSY, Paddle	1
38	550-741	GEAR	1
39	525-486	PADDLE, Half	2
40	000-00702-BH-H	SCREW, RD HD, 6-32 x .125 SST	12
40A	000-09400-AF-H	WASHER, Split Lock, #10	12
41	503-747	LABEL, CHEM FIX	A/R
42	40807	BEARING, Nyliner	8
43-52	Not Used		
53	525-423	PLATE ASSY, Retainer	1
	21583-1	SUPPORT BAR (Not Shown)	2
	000-00703-BH-H	SCREW, RD HD, 6-32 x 3/16	6

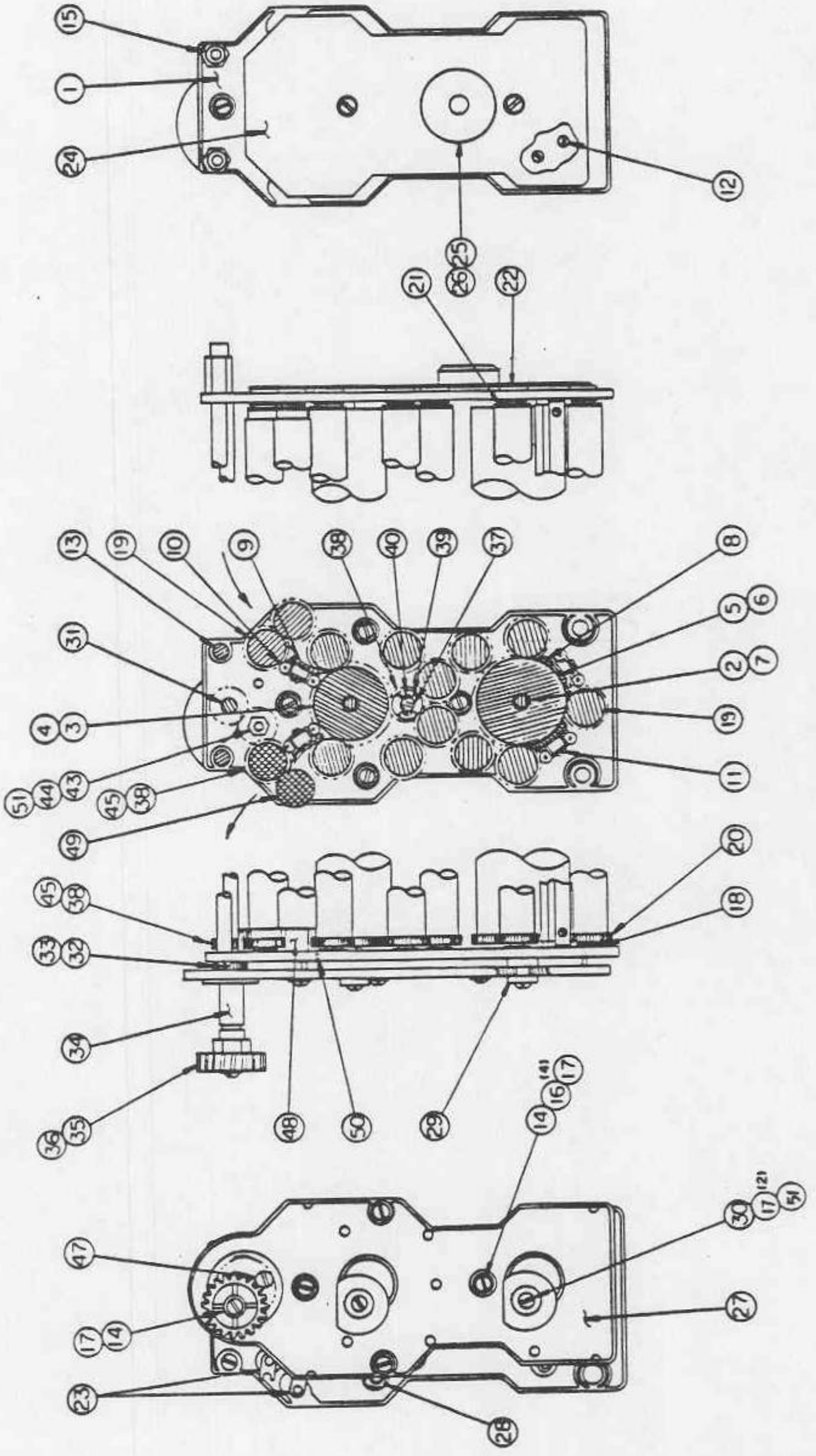

15
1
24
12
25
26
21
22
13
19
10
9
38
40
39
37
8
5
6
2
7
19
11
31
4
3
51
44
43
45
38
49
20
18
45
38
33
32
34
35
36
48
50
29
14
16
(4)
17
30
17
(2)
51
47
17
14
27
23
28

Figure 6-9, Wash Rack

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-9	575-10072	WASH RACK, PROCESSOR, MILITARY	1
6-9- 1	525-745	PLATE, STATIONARY	2
2	525-209	ROD, Tie	2
3	525-21	ROLLER ASSY, 2.0	1
4	525-783	GEAR, 2.0 Roller	1
5	525-22	ROLLER ASSY, 2.5	1
6	525-782	GEAR, 2.5 Roller	1
7	525-786	BEARING, Roller	4
8	525-29	SHOE ASSY, Rack, Lower	2
9	525-47	SHOE ASSY, Rack, Upper	2
10	504-789	BLOCK, Film Guide	8
11	000-00704-BG-H	SCREW, PAN HD, 6-32 x .250, SST	8
12	000-00712-BL-H	SCREW, PAN HD, 6-32 x .750, SST	16
13	525-229	ROD, Upper, Tie	2
14	000-00906-BG-H	SCREW, T HD, 10-24 x .375, SST	14
15	525-748	SUPPORT, Rack, Gear	2
16	525-206	PIN, Pivot	8
17	000-09400-AC-H	WASHER, .196 x .593 x .032, SST	10
18	550-783	BEARING, Rack	34
19	568-1077	ROLLER, Rack w/Gear	13
20, 21, 41, 42, & 46		Not Used	
22	550-759	PIN, Roller	13
23	550-758	CRANK, Roller	13
24	525-423	PLATE, Retainer	1
25	525-788	INLET, Rack	1
26	86902	RING, Retaining	1
27	575-10045	PLATE ASSY, Moving	1
28	525-790	LINK, Pivot	4
29	550-754	RETAINER, Moving Plate	2
30	000-00920-BG-H	SCREW, T HD, 10-24 x 1.250, SST	2
31	525-232	SHAFT, Rack Drive	1
32	525-205	PIN, Drive Shaft	1
33	21353	GEAR, Rack Driven	1
34	525-747	SPACER, Support	1
35	000-15512-AC-H	PIN, Groove, .156 x .750, SST	1
36	525-706	GEAR, Rack Worm	1
37	525-83	SHAFT ASSY, Paddle	1
38	550-741	GEAR, Crossover Drive	3
39	525-486	PADDLE, Half	2
40	000-00702-BH-H	SCREW, RD HD, 6-32 x .125 SST	6
43	504-730	BEARING, Idler	2
44	525-7060	GEAR, Crossover Idler	1
45	000-15410-AC-H	PIN, Groove, .125 x .625, SST	2
47	000-00908-AC-H	SCREW, FH, 10-24 x .500, SST	1
48	525-712	SPACER, Squeegee	1
49	525-85	ROLLER ASSY, Squeegee	2
50	000-00804-AQ-H	SCREW, Set, 8-32 x .250, SST	2
51	504-222	PIN, Idler Gear	1
	21583	SUPPORT BAR (Not Shown)	1
	000-09400-AF-H	WASHER, #10, Spg. Lock	12

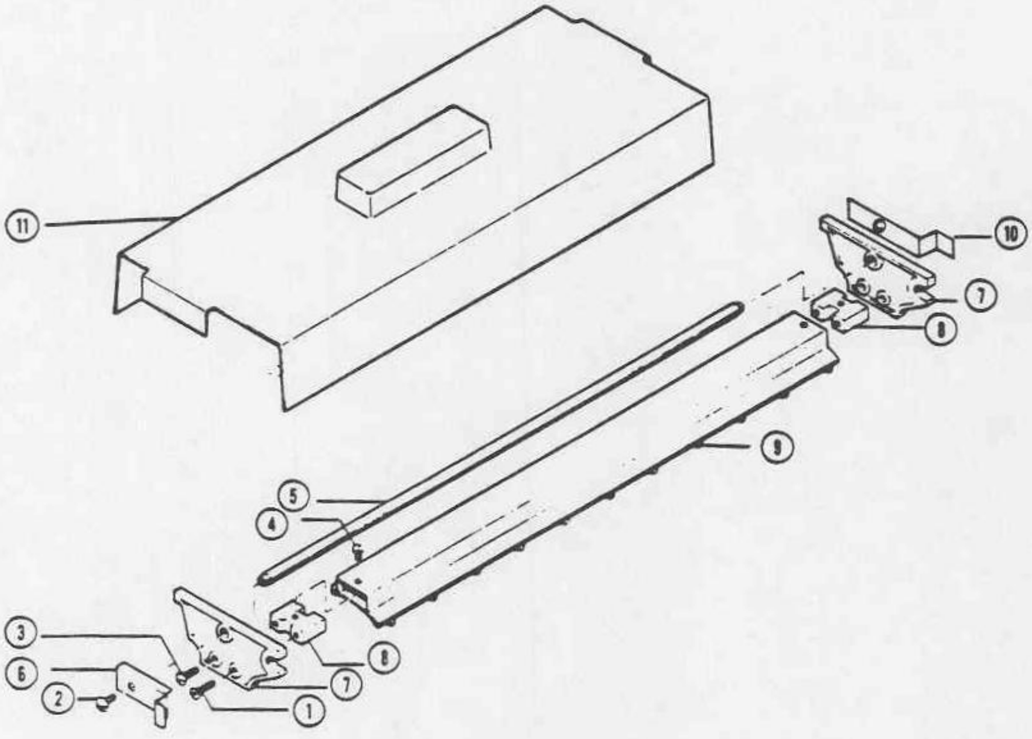


Figure 6-10, Crossover Assembly

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-10	525-1187	CROSSOVER ASSEMBLY	
6-10- 1	000-00810-AC-H	SCREW, FH, 8-32 x 5/8 (16mm)	
2	000-00906-BG-H	SCREW, TH, 10-24 x 3/8 (10mm)	
3	000-00808-BG-H	SCREW, TH, 8-32 x 1/2 (13mm)	
4	000-00806-BL-H	SCREW, PAN HD, Thr.Cut, 8-32x3/8 (10mm)	
5	525-234	ROD, Crossover	
6	525-420	STOP, Crossover	
7	525-751	PLATE, Crossover	
8	525-752	PAD, Crossover	
9	525-1188	SHOE ASSY, Crossover	
10	550-4042	LATCH, Crossover	
11	525-767	GUARD, Splash	

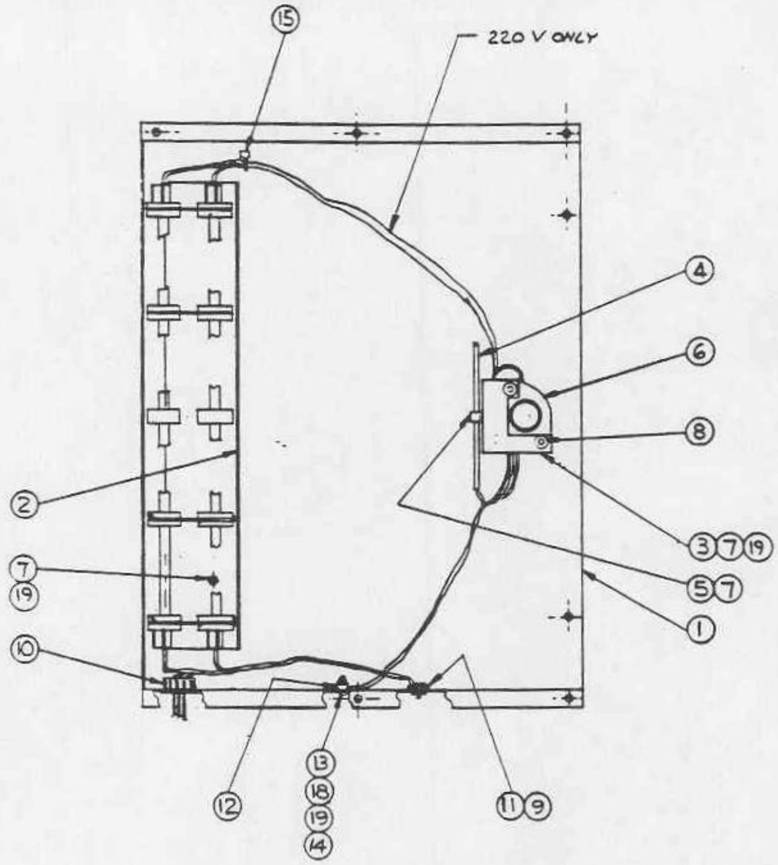


Figure 6-11, Dryer Front

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-11	575-10025	DRYER FRONT	
6-11- 1	575-4029	DUCT, Air	1
2	575-10041	HEATER ASSY, Dryer, 750W	1
3	575-4032	BRACKET, Safety	1
4	88339	SENSOR	1
5	30601	CLAMP, Cable	1
6	90239	THERMOSTAT	1
7	000-00806-BG-H	SCREW, TH, 8-32 x .375, SST	5
8	000-00704-BH-H	SCREW, RH, 6-32 x .250, SST	2
9	90596	CLAMP, Terminal	1
10	30513	BUSHING, Snap	1
11	89831	LABEL, Grounding	1
12	89019	TIE, Cable	1
13	000-00808-BG-H	SCREW, TH, 8-32 x .500, SST	1
14	000-05000-AA-H	NUT, Hex, 8-32, SST	1
15	81691	TIE, Cable	A/R
16-17	Not Used		
18	000-09300-AA-H	WASHER, Flat, #8, SST	1
19	000-09300-AF-H	WASHER, Lock, Spr., SST	5

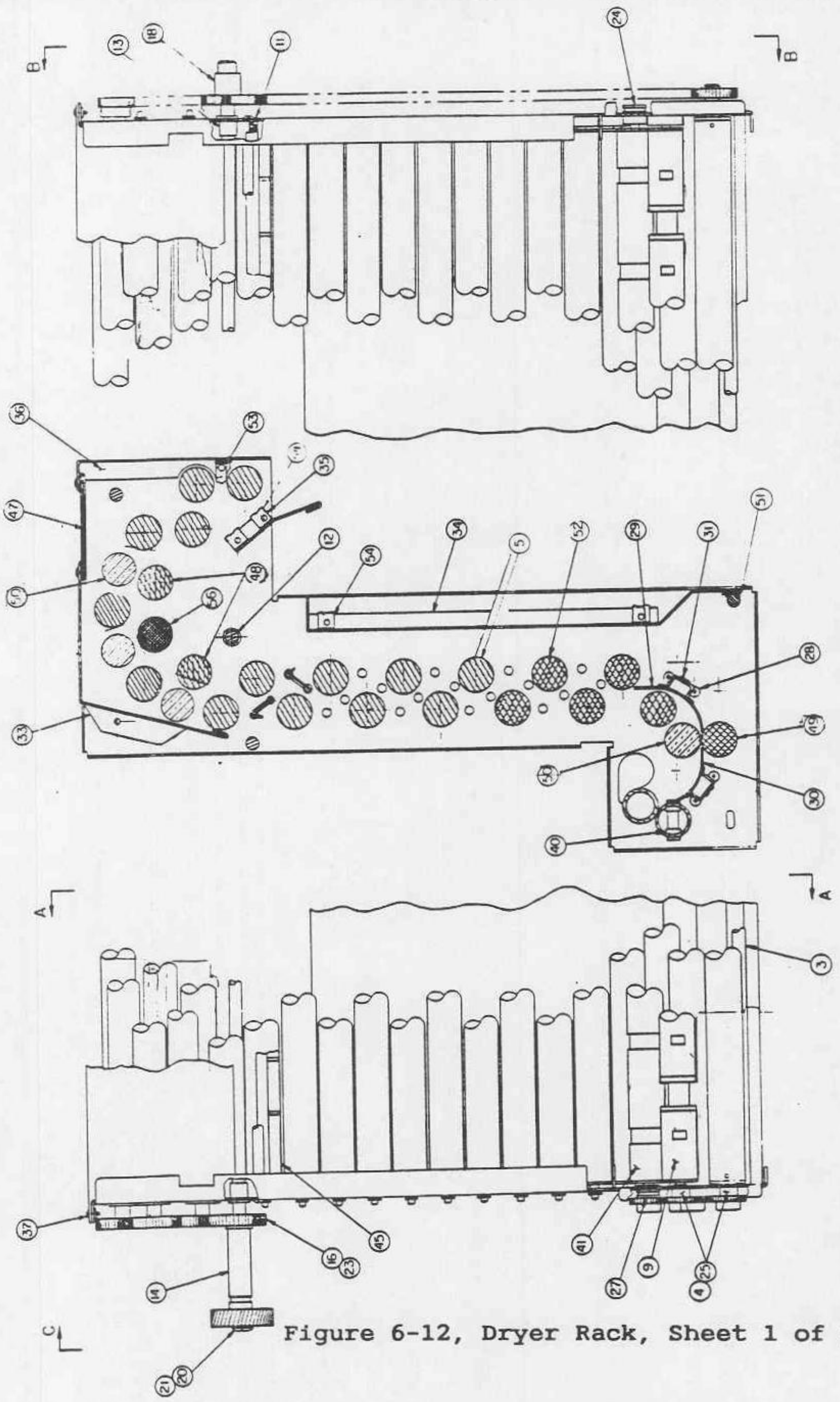

B
13
18
11
24
B
36
53
35
47
12
54
34
5
52
29
31
51
48
50
56
28
33
49
50
30
40
SECTION A-A
A
A
3
37
16
23
45
14
41
27
9
4
25
21
20
C

Figure 6-12, Dryer Rack, Sheet 1 of 2

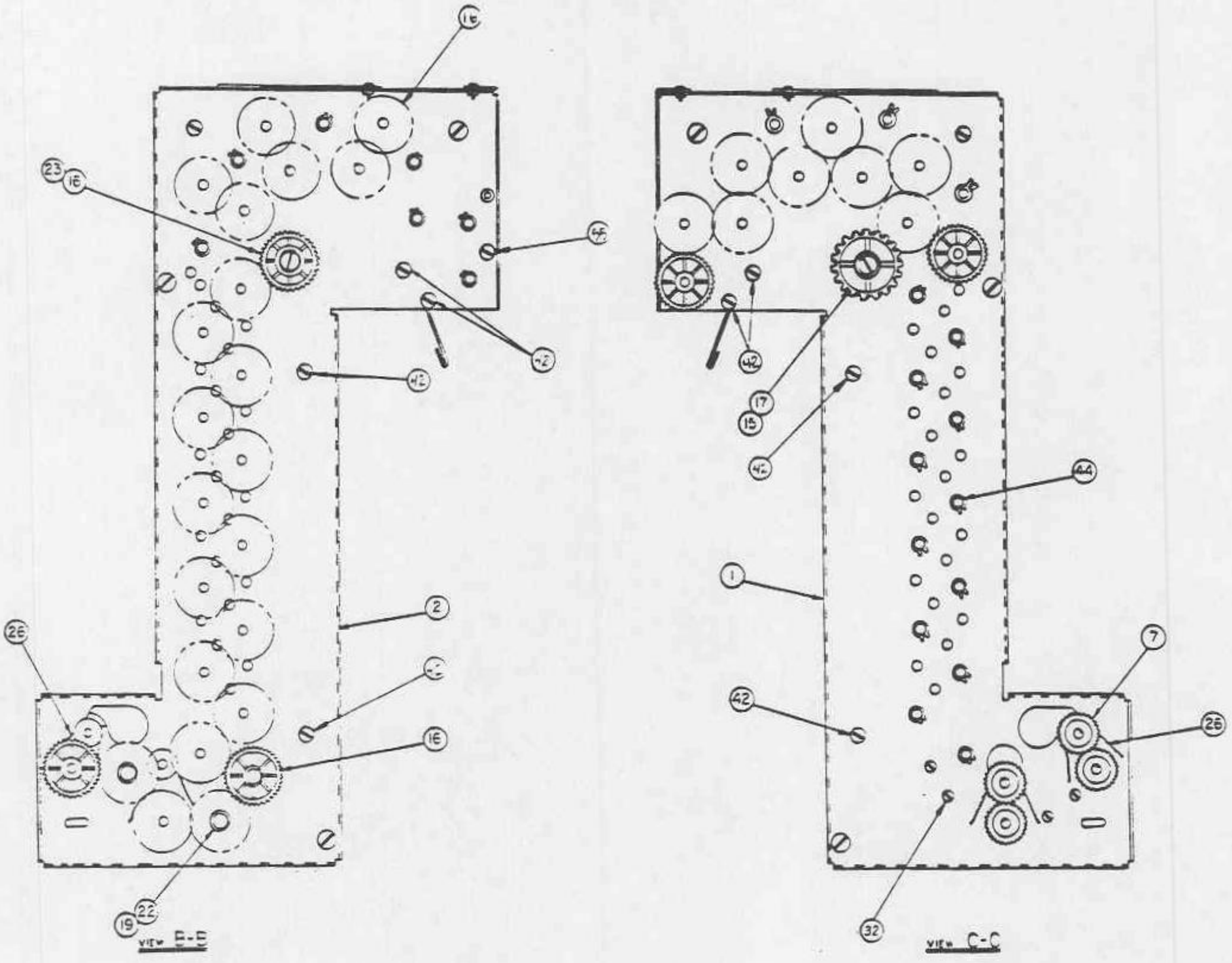

16
23
16
45
42
42
42
2
26
42
16
19
22
VIEW B-B
42
17
15
42
44
1
7
26
42
32
VIEW C-C

Figure 6-12, Dryer Rack, Sheet 2 of 2

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-12	575-10017	DRYER RACK	1
6-12- 1	525-1056	RACK ASSY, Dryer, RH	1
2	525-1057	RACK ASSY, Dryer, LH	1
3	525-246	ROD, Dryer Tie	3
4	40809	BEARING, Nyliner	30
5	525-67	ROLLER FINAL ASSY, Dryer #1	14
7	88-173	GEAR ASSY, Planetary	10
9	575-10024	ROLLER FINAL ASSY, Stripping	1
11	504-266	SPRING	1
12	525-208	SHAFT, Dryer Drive	1
13	525-786	BEARING	2
14	525-774	BEARING, Support, RH	1
15	000-15512-AC-H	PIN, Groove, .156 x .750, SST	1
16	504-711	GEAR	5
17	525-706	GEAR, Rack Worm	1
18	525-717	BEARING, Support, LH	1
19	525-243	POST, Idler	3
20	000-00906-BG-H	SCREW, T HD, 10-24 x .375, SST	11
21	000-09400-AC-H	WASHER, .196 x .593 x .032 Thk, SST	5
22	47125-PH	RING, Retaining, .375, SFT	3
23	000-15410-AC-H	PIN, Groove, .125 x .625, SST	2
24	76-710	BEARING, Bottom Roller	2
25	511-714	BEARING, Thrust	2
26	76-219	SPRING, Bottom Roller	4
27	88-712	BEARING, Roller	2
28	504-789	BLOCK, Film Guide	10
29	525-41	SHOE ASSY, Dryer	1
30	525-29	SHOE ASSY, Dryer, Lower	1
31	000-00704-BL-H	SCREW, PAN HD, Thd Cut., .250, SST	4
32	000-00706-BA-H	SCREW, PAN HD, Thd Cut., .375, SST	8
33	525-4037	BAFFLE, Upper	1
34	525-473	BAFFLE, Vertical	1
35	525-474	SCOOP, Lower	1
36	525-4038	BAFFLE, Entering	1
37	000-00806-BG-H	SCREW, T HD, 8-32 x .375, SST	4
40	550-733	COLLAR STRIPPER	10
41	525-1226	ROLLER ASSY, Upper Stripping	1
42	000-00808-BG-H	SCREW, T HD, 8-32 x .500, SST	12
44	47117-PH	RING, Retaining	22
45	525-4279	PLATE, Dryer Guide	2
47	525-4224	SCREEN, Dryer	1
48	575-10034	ROLLER FINAL ASSY, Dryer	2
49	575-10018	ROLLER FINAL ASSY, Dryer	1
50	575-10020	ROLLER ASSY, Dryer	4
51	Not Used		
52	525-1287	ROLLER FINAL ASSY, Dryer #4	5
53	81685	NUT, Speed, #6	2
54	000-05000-AK-G	NUT, Speed, #8	8
55	000-00708-BG-H	SCREW, T HD, 6-32 x .500, SST	2
56	575-10031	ROLLER FINAL ASSY, Dryer	1

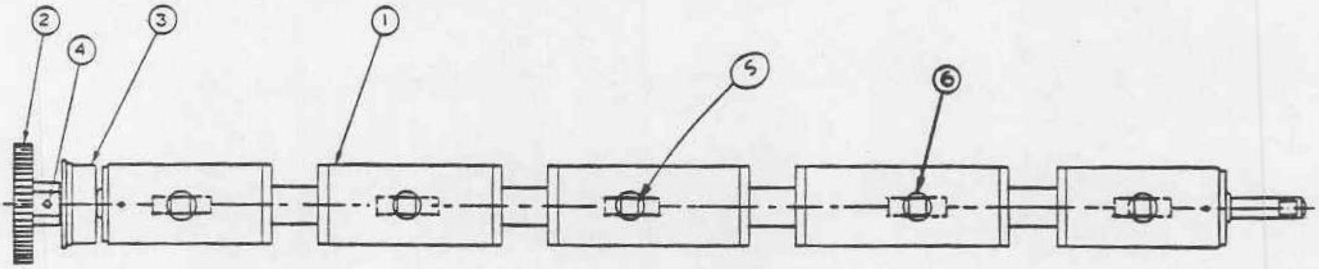


Figure 6-13, Stripping Roller Final Assembly

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-13	575-10024	STRIPPING ROLLER, COMPLETE ASSY	1
6-13-1	575-10001	ROLLER ASSY, Lower Stripping	1
2	525-765	GEAR, Dryer, Exit	1
3	525-781	BEARING, Dryer Roller	1
4	000-15312-AB-H	PIN, Slotted Spring 3-32 x 3/4, SST	1
5	525-7031	STRIPPER, Film	5
6	550-733	COLLAR	10

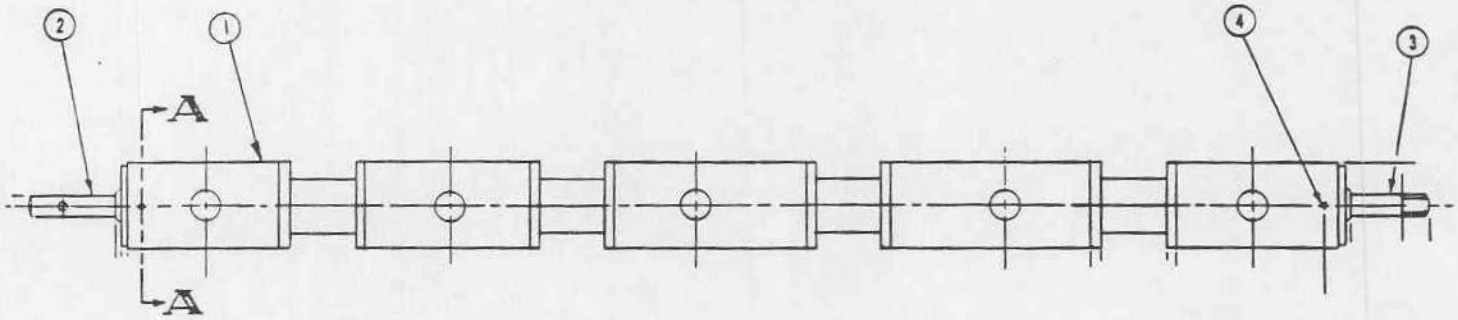


Figure 6-14, Stripping Roller

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-14	575-10001	STRIPPING ROLLER, COMPLETE ASSY	1
6-14-1	525-000726	ROLLER, Dryer	1
2	525-58	BUSHING ASSY, Right	1
3	88-41	BUSHING ASSY, Inner-Wet	1
4	000-15204-AA-H	PIN, Groove, 1/16 x 1/4, SST	2

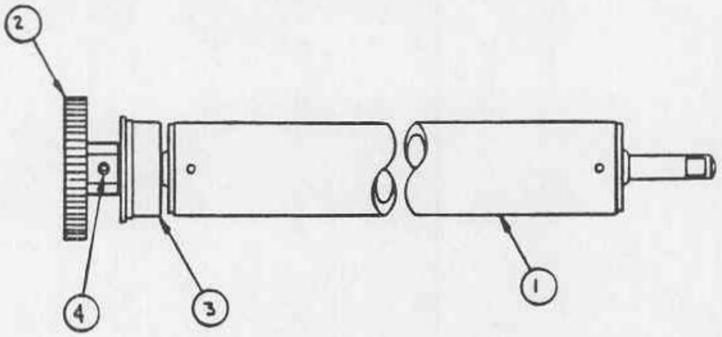


Figure 6-15, Dryer Roller

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-15	575-10018	DRYER ROLLER COMPLETE ASSY	1
6-15-1	525-62	ROLLER ASSY, Dryer (#3)	1
2	525-765	GEAR, Dryer, Exit	1
3	525-781	BEARING, Dryer Roller	1
4	000-15312-AB-H	PIN, Slotted Spring	1

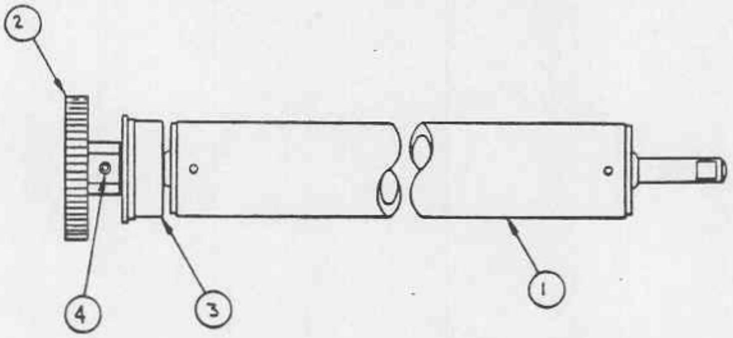


Figure 6-16, Dryer Roller

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-16	575-10031	DRYER ROLLER COMPLETE ASSY	1
6-16-1	525-62	ROLLER ASSY, Dryer	1
2	525-7033	GEAR, Dryer, Special	1
3	525-781	BEARING, Dryer, Roller	1
4	000-15312-AB-H	PIN, Slotted Spring	1

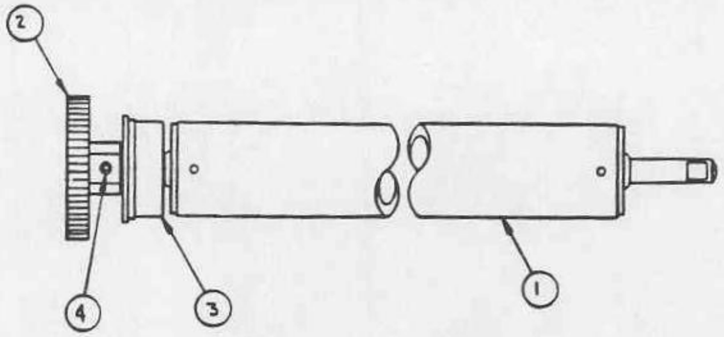


Figure 6-17, Dryer Roller

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-17	575-10034	DRYER ROLLER COMPLETE ASSY	1
6-17-1	525-62	ROLLER ASSY, Dryer (#3)	1
2	504-710	GEAR, Dryer Roller	1
3	525-781	BEARING, Dryer Roller	1
4	000-15312-AB-H	PIN, Slotted Spring	1

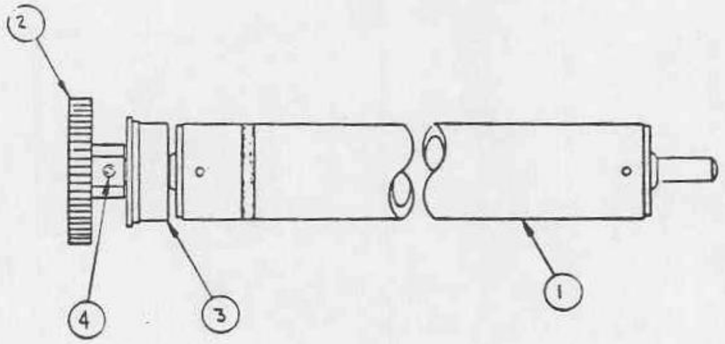


Figure 6-18, Dryer Roller No. 4

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-18	525-1287	DRYER ROLLER #4, COMPLETE ASSY	1
6-18-1	525-61	ROLLER ASSY, Dryer (#1)	1
2	525-765	GEAR, Dryer Exit	1
3	525-781	BEARING, Dryer Roller	1
4	000-15312-AB-H	PIN, Slotted Spring	1

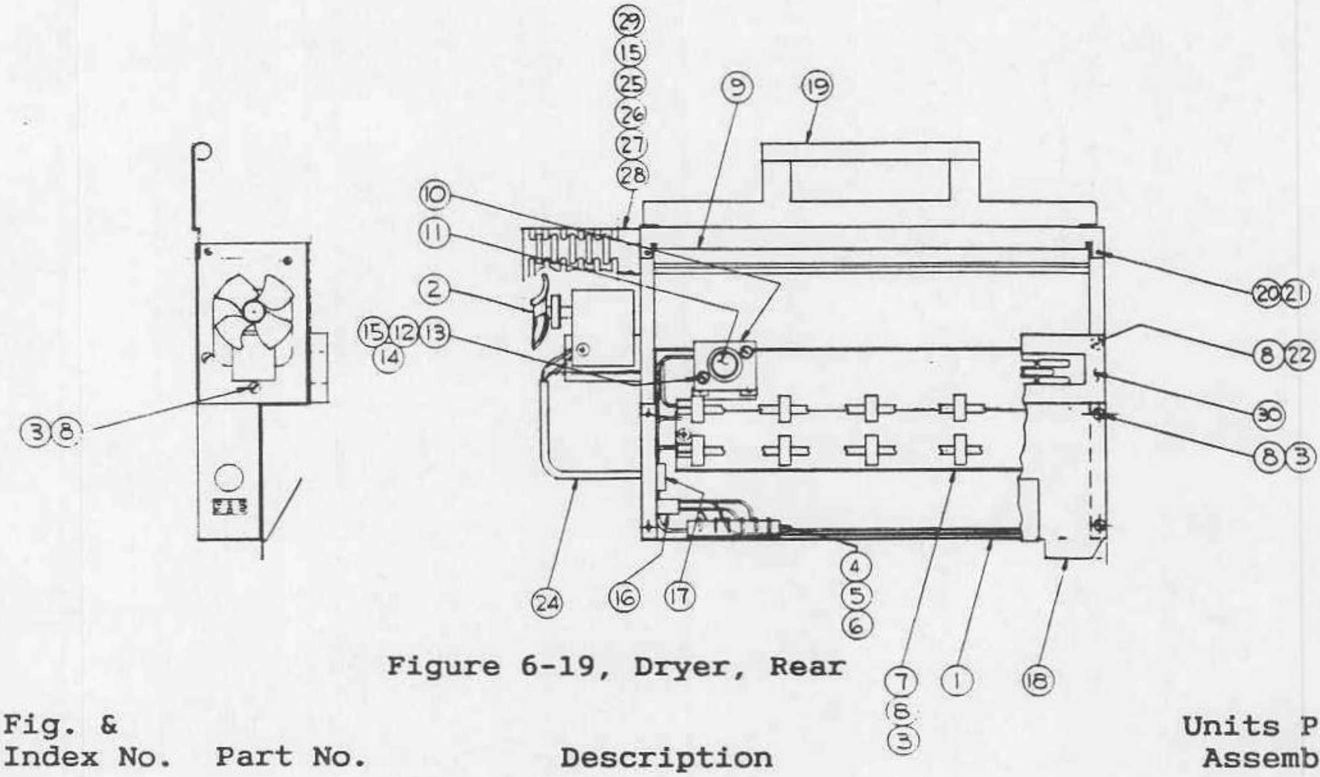


Figure 6-19, Dryer, Rear

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-19		DRYER, REAR	
6-19- 1	525-1024	SHROUD ASSY, Heater	1
2	525-1191	BLOWER, Tangential	1
3	000-09300-AF-H	WASHER, Spring Lock, #8, SST	10
4	87450	STRIP, Terminal	1
5	82794	STRIP, Marker	1
6	000-00710-BH-H	SCREW, RD HD, 6-32 x .625, SST	2
7	575-10041	HEATER ASSY, Dryer, 750W	1
8	000-00806-BG-H	SCREW, THD, 8-32 x .375, SST	12
9	87491	LABEL, HOT MOTOR	1
10	575-4003	BRACKET, Thermostat	1
11	90239	THERMOSTAT	1
12	000-09200-AB-H	WASHER, FL, #6, SST	2
13	000-00706-BG-H	SCREW, THD, 6-32 x .375, SST	4
14	000-09200-AF-H	WASHER, Spg. Lock, #6, SST	1
15	000-05000-AK-G	NUT, Speed, #6-32, Spg., STL	4
16	88401	CONNECTOR, Female	1
17	30520	BUSHING, Strain Relief	1
18	525-4032	COVER, Heater	1
19	525-4066	HANGER, Fan	1
20	000-00806-AC-H	SCREW, F HD, 8-32 x .375, SST	2
21	000-05100-AL-G	NUT, Speed, 8-32, Spg., STL	2
22	000-05100-AK-G	NUT, Speed, 8-32, Spg, STL	2
23		Not Used	
24	97-87-050	TUBING, Vinyl Coated Fiberglass	1
25-29		Not Used	
30	550-721	GASKET, Intake	1

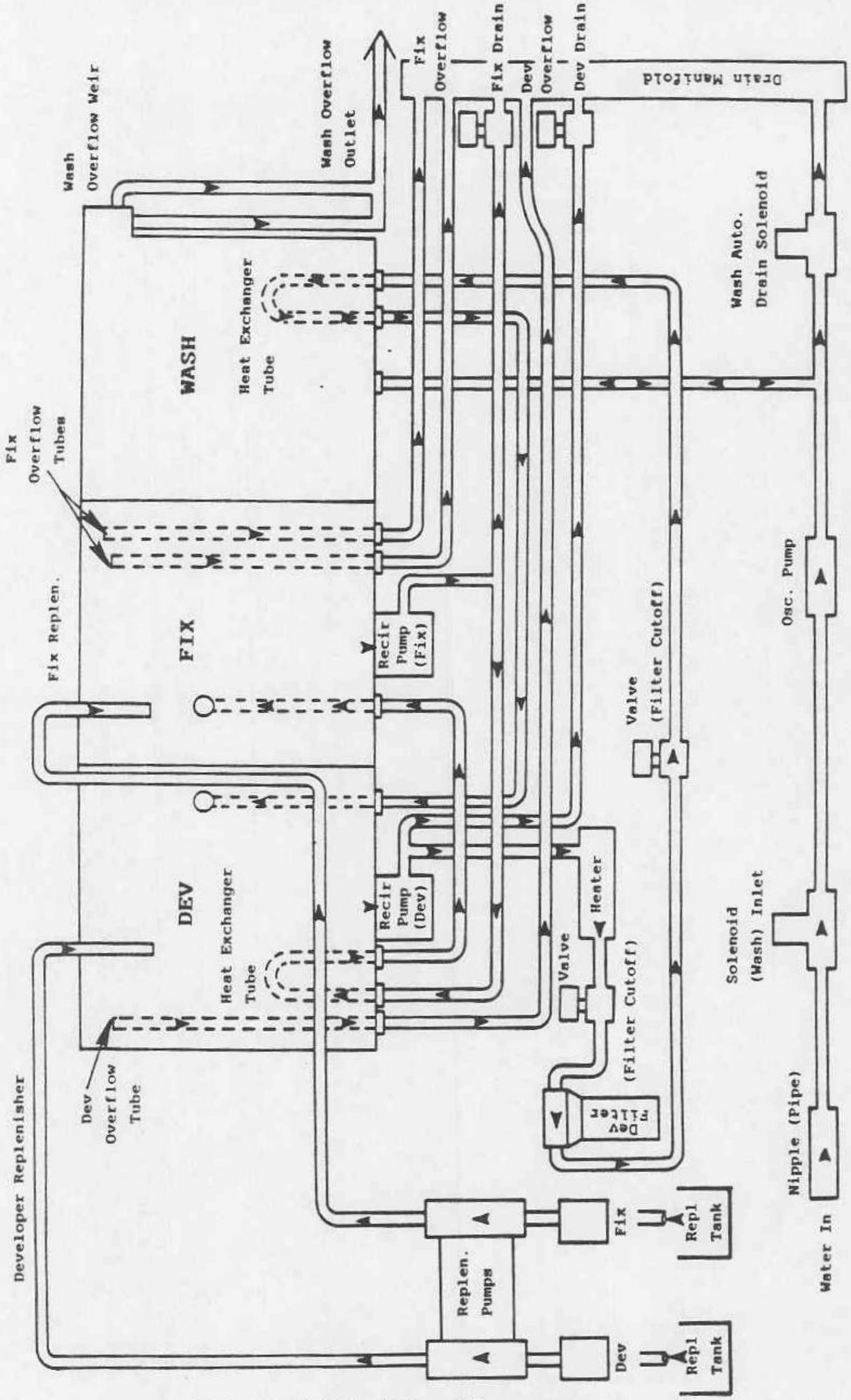

Fix Overflow
Fix Drain
Dev Overflow
Dev Drain
Drain Manifold
Wash Overflow Weir
Wash Overflow Outlet
Wash Auto. Drain Solenoid
WASH
Heat Exchanger Tube
Fix Overflow Tubes
Fix Replen.
FIX
Recir Pump (Fix)
Valve (Filter Cutoff)
Osc. Pump
DEV
Recir Pump (Dev)
Heater
Valve (Filter Cutoff)
Heat Exchanger Tube
Dev Overflow Tube
Developer Replenisher
Dev Filter
Solenoid (Wash) Inlet
Nipple (Pipe)
Replen. Pumps
Fix
Repl Tank
Dev
Repl Tank
Water In

Figure 6-20, Plumbing Layout

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-20	575-1900	PLUMBING ASSEMBLY	
6-20- 4	575-7013	TUBING, Formed, .500 ID x .093 W, Red	
6	575-7008	TUBING, Formed, .500 ID x .093 W, Red	
20	575-7011	TUBING, Formed, .500 ID x .093 W, Clear	

NOTE: For other Index Nos. in **Figure 6-20, Plumbing Layout** on page 6-35, order by the length required, as follows:

3/32" (WALL) x 1/2" ID = 1/2" ID x 11/16" OD

RED	P/N 9527062640
BLUE	P/N 9528062640
CLEAR	P/N 9526062640

1/16" (WALL) x 3/8" ID = 3/8" ID x 1/2" OD

RED	P/N 9527062590
BLUE	P/N 9528062590
CLEAR	P/N 9526062590

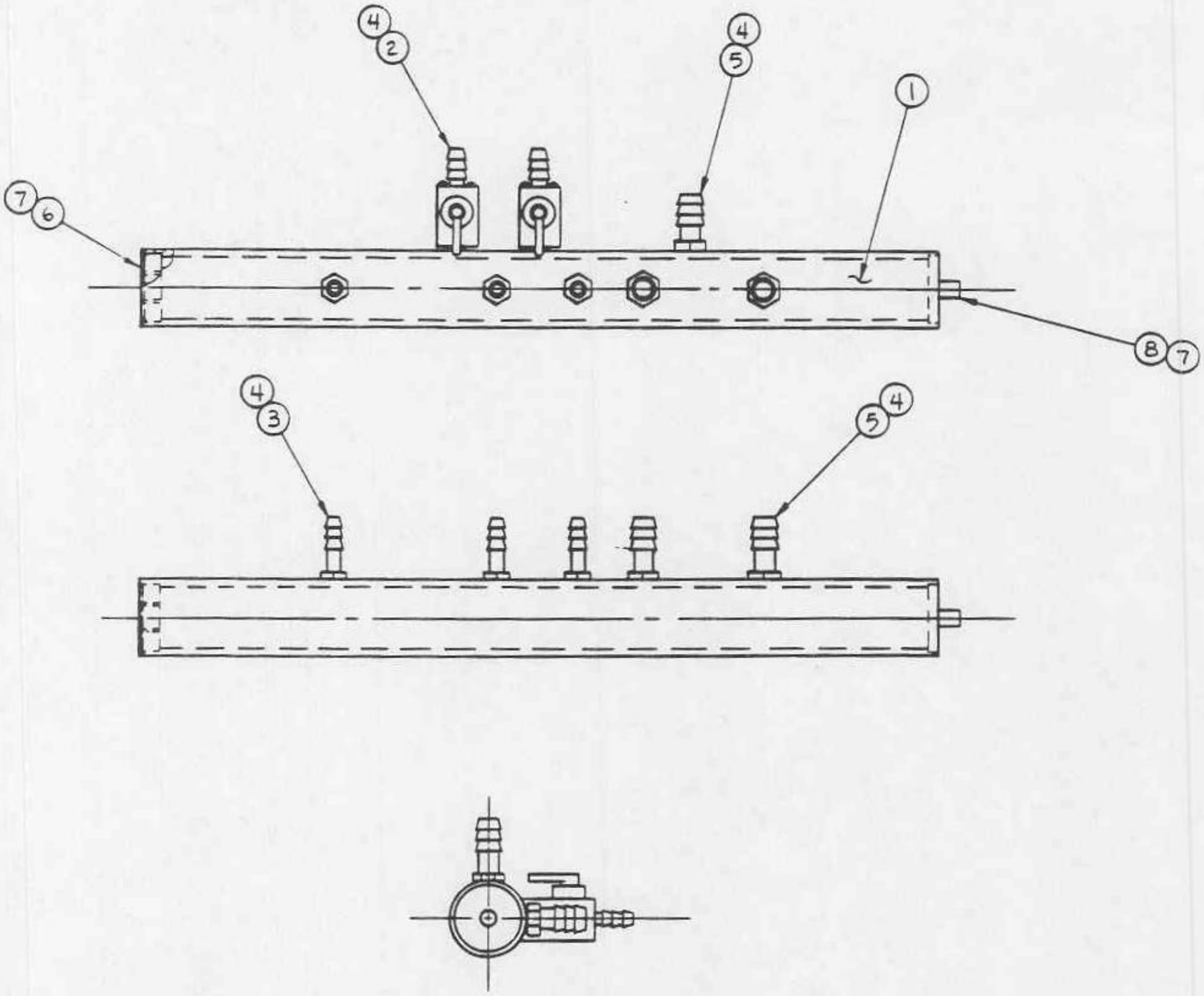


Figure 6-21, Drain Manifold

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-21	575-10012	DRAIN MANIFOLD COMPLETE ASSY	
6-21-1	575-7002	MANIFOLD, Drain	1
2	87220	VALVE, Ball	2
3	46200-A	FITTING, Pipe	3
4	84150	SEALANT, Silicone	A/R
5	84005	FITTING, Pipe	3
6	503-723	PLUG, Threaded	1
7	81891	ADHESIVE, Weld on PVC	A/R
8	525-795	PLUG, Manifold	1

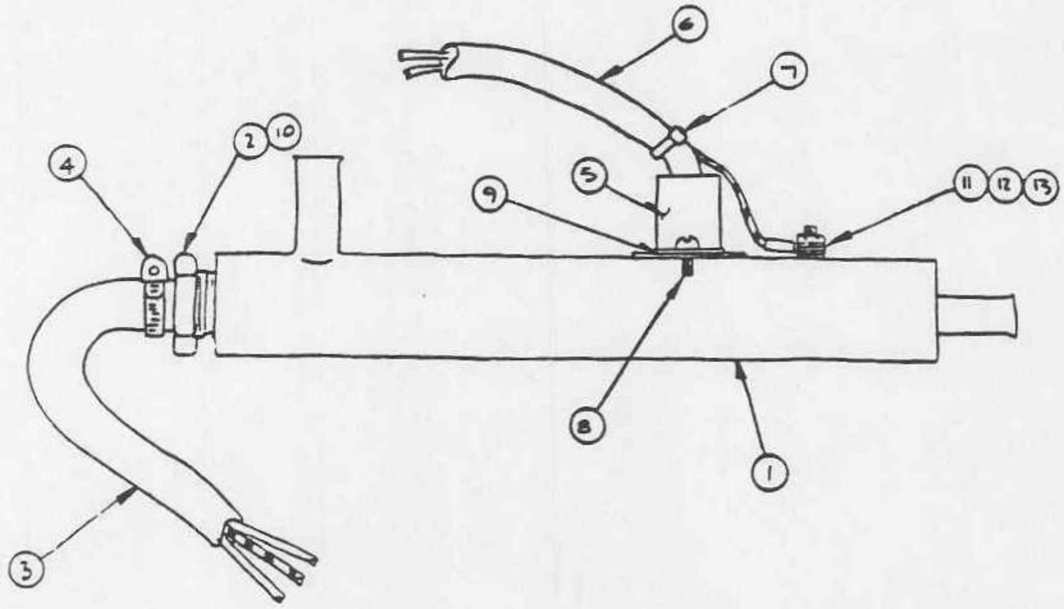


Figure 6-22, Heat Tube

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-22	575-10027	HEAT TUBE, COMPLETE ASSY	
6-22- 1	575-10013	WELDMENT, Heat Tube	1
2	92145	HEATER, Immersion, 240V	1
3	97-89-120	TUBING, Vinyl Coated Fiberglass	1
4	41406	CLAMP, Hose	1
5	92030	THERMOSTAT, Auto Open	1
6	97-76-180	TUBING, Vinyl Coated Fiberglass	1
7	31706	TIE, Cable	1
8	000-00503-BH-H	SCREW, RD HD, 4-40 x .187, SST	2
9	88215	GREASE, Thermal	A/R
10	84150	SEALANT, Silicone	A/R
11	000-09300-AB-H	WASHER, Flat, #8, SST	1
12	000-09300-AF-H	WASHER, Spg. Lock, #8, SST	1
13	000-05000-AA-H	NUT, Hex, 8-32, SST	1

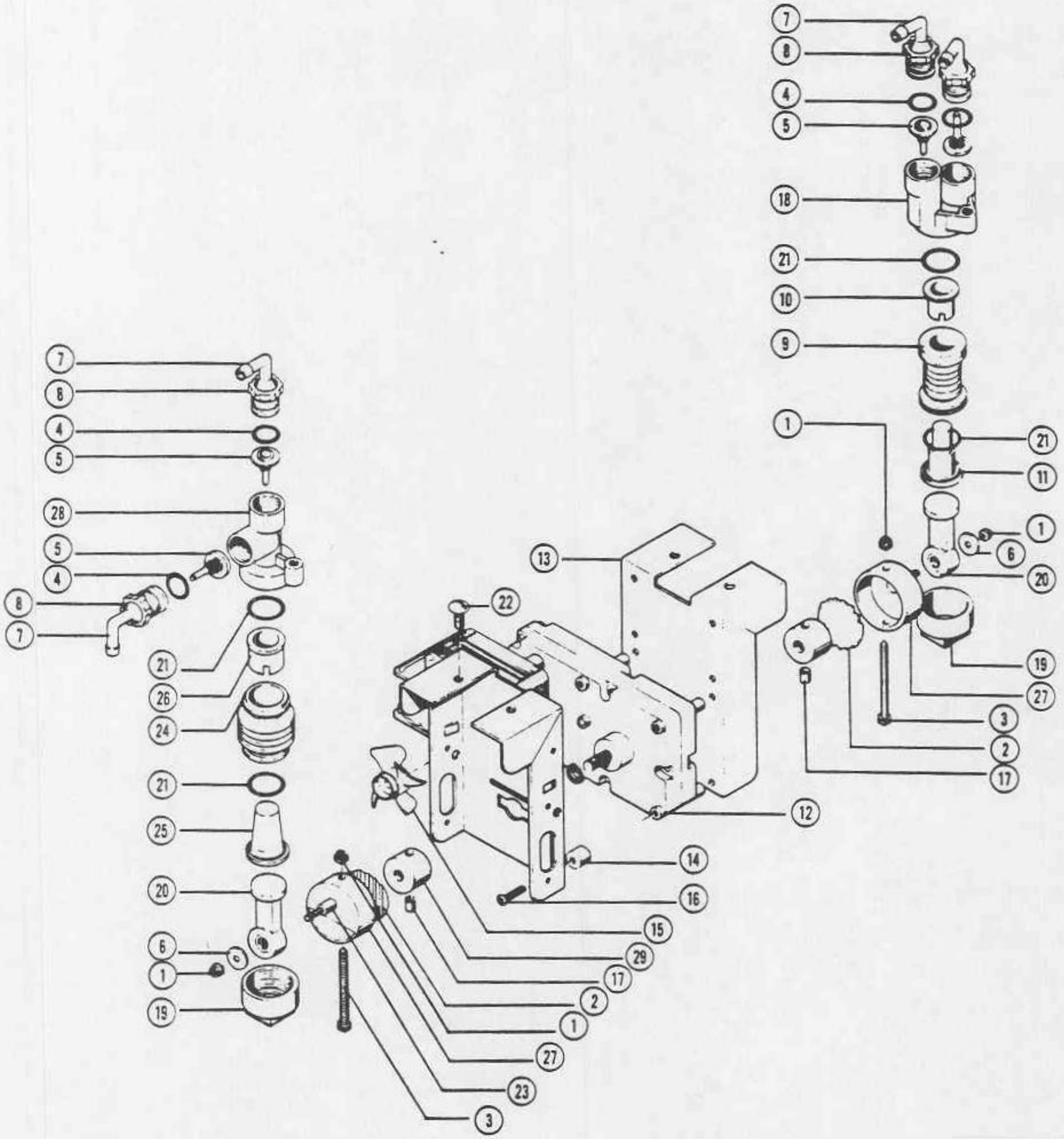
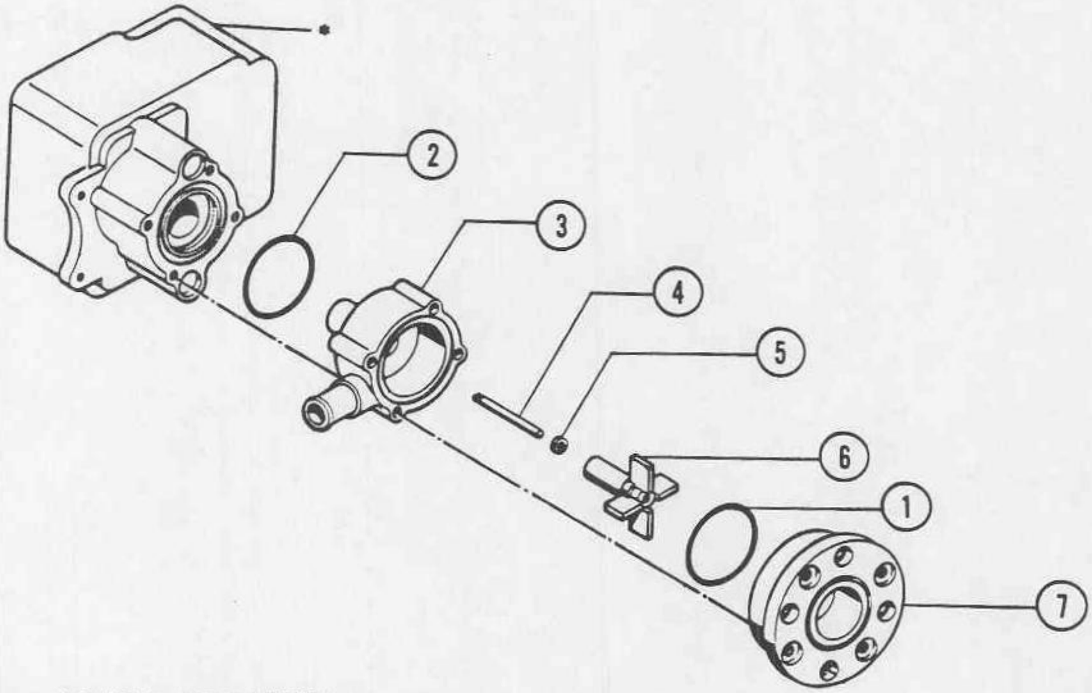

7
8
4
5
18
21
10
9
1
21
11
1
6
20
19
27
3
2
17
12
13
22
14
16
15
29
17
2
1
27
23
3
7
8
4
5
28
5
4
8
7
21
26
24
21
25
20
6
1
19

Figure 6-23, Replenisher Pump

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-23	87366	REPLENISHER PUMP ASSY, 220V, COMPLETE	
6-23- 1	000-05100-AE-H	NUT, Hex, 8-32	
2	85908	DISC, Tolerance	
3	000-00832-AG-H	SCREW, Adjusting	
4	45818	O-RING	
5	85913	VALVE	
6	000-09300-AB-H	WASHER	
7	86027	ELBOW, Plastic, 90 deg, 3/8 (10mm) ID Hse	
8	86028	NUT, Plastic	
9	86583	BELLOWS	
10	86584	GUIDE, Displacement	
11	86585	CUP, Displacement	
12	87389	MOTOR, Gear, 230V	
13	87391	SPACER	
14	87390 *	BRACKET	
15	87392	FAN	
16	000-00810-BJ-H	SCREW, Shakeproof	
17	87396	SPACER	
18	87397	BODY, Valve	
19	87398	NUT, Coupling	
20	98399	ROD, Connecting	
21	45819	O-RING	
22	87403 *	SCREW, Thread-forming	
23	87744	BUSHING	
24	87745	BELLOWS, Formed	
25	87746	CUP, Displacement	
26	87749	CUP	
27	9992300608	CRANK ASSY	
28	87751	BODY, Valve	
29	87752	BUSHING, Drive	

* Not Used



*Not available separately.
220v. 50/60 Hz

Figure 6-24, Circulation Pump

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-24	46320	CIRCULATION PUMP ASSY, 230V, 50/60 Hz	
6-24-1	45826	O-RING, .062" CS, 1.312" ID (1.5mm,3.3cm)	
2	45830	O-RING, Pump	
3	91099	HOUSING, Pump	
4	91100	SHAFT, Pump	
5	91101	WASHER, Pump Thrust	
6	91102	IMPELLER, Magnet, Pump	
7	91923	COVER, Adapter Pump	

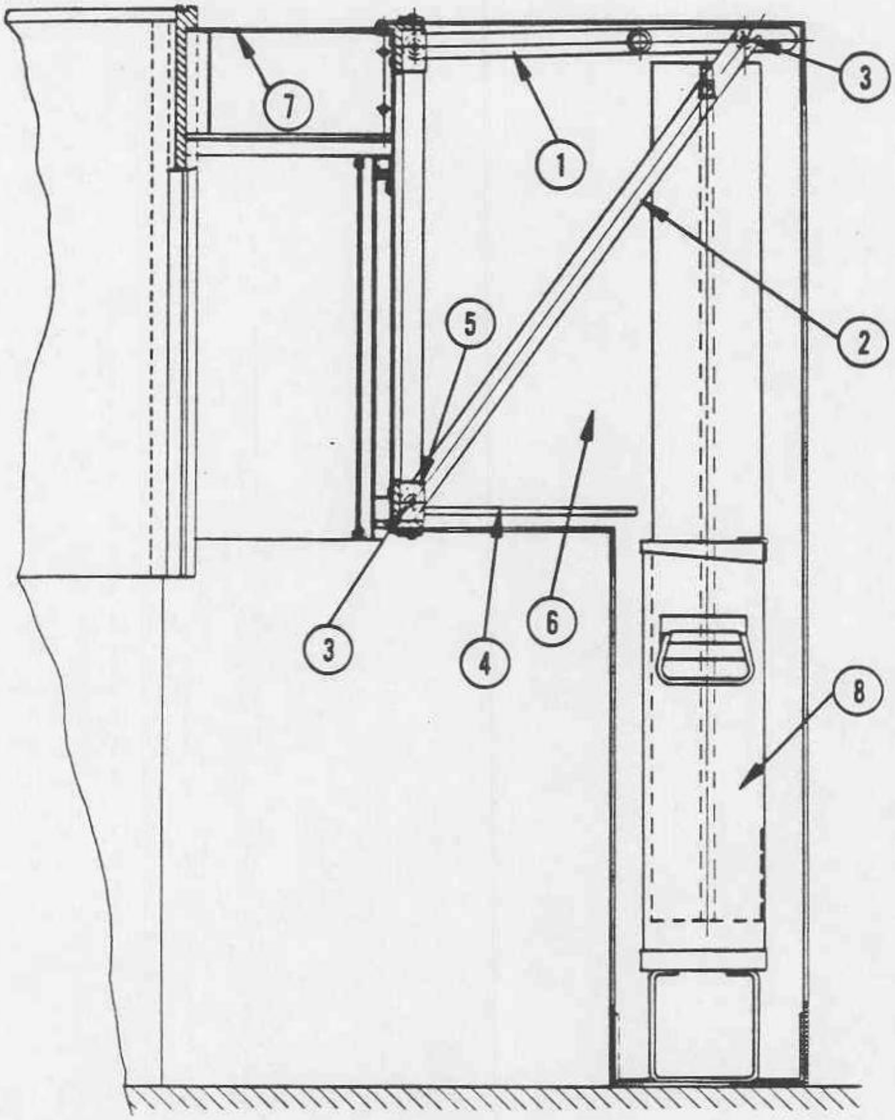


Figure 6-25, Daylight Loading Assembly

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-25	990-230-1702	GENERAL ASSEMBLY, Daylight Loader	
6-25- 1	000-002-1370	FRAME & DAYLIGHT BAG ASSY	1
2	000-002-1371	BRACE, Daylight Loader	2
3	000-002-1374	PIN, Shoulder	4
4	000-002-1385	WORK TABLE	1
5	000-002-1698	HINGE, Work Table	1
6	000-002-0966	BAG ASSEMBLY	1
7	000-002-1381	SHROUD ASSY, Feed Tray Adapter	1
8	000-020-0903	LEAD LINED BOX	1

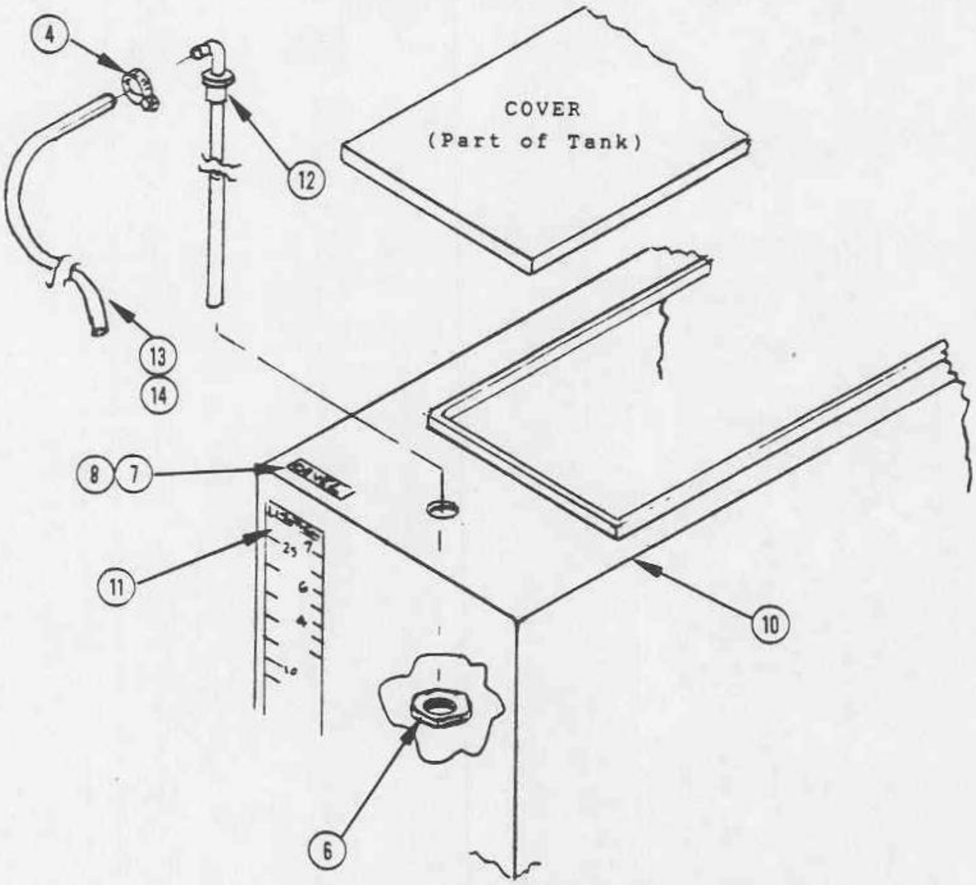


Figure 6-26, Replenisher Tank Kit

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-26	9992301001	REPLENISHER TANK KIT, 2-11 GAL.	
	9992301002	REPLENISHER TANK KIT, 2-7 GAL.	
	9992301003	REPLENISHER TANK KIT, 7-11 GAL.	
6-26- 1	568-007064	LID, Floating, 7-Gal. (Not Shown)	1
2	799-001018	REPLENISHMENT TANK HARDWARE	1
3	0000081691	CABLE TIE (Not Shown)	1
4	0000041406	HOSE CLAMP, Worm Gear, 3/8-7	2
5	0000041405	HOSE CLAMP, Worm Gear, 1/4-5 (NS)	2
6	000-06702-AA-R	NUT, Union, 3/4-20 x 1/4	2
7	503-000746	NAMEPLATE, Developer	1
8	503-000747	NAMEPLATE, Fixer	1
9	568-007065	LID, Floating, 11-Gal. (Not Shown)	1
	568-007064	LID, Floating, 7-Gal. (Not Shown)	1
10	568-007078	TANK, Replenisher, 11-Gal.	2
	568-007074	TANK, Replenisher, 7-Gal.	2
11	568-007083	NAMEPLATE, Tank Level, 11-Gal.	2
	568-007082	NAMEPLATE, Tank Level, 7-Gal.	2
12	568-012032	DIP TUBE ASSY	2
13	9527062590	TUBE, 3/8 ID x 1/2 OD, RED Vinyl	3.33 ft
14	9528062590	TUBE, 3/8 ID x 1/2 OD, BLUE Vinyl	3.33 ft

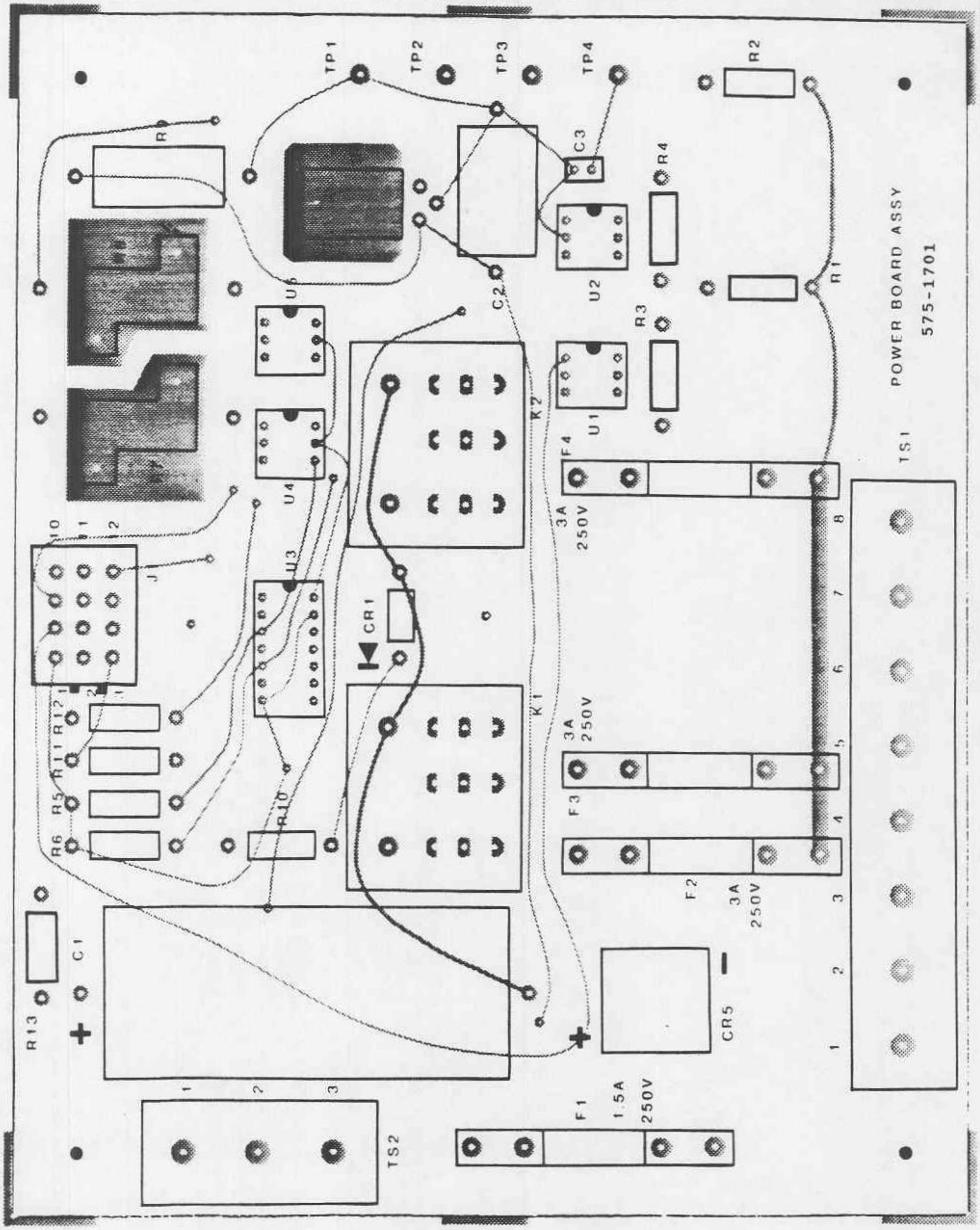

TP1
TP2
TP3
TP4
R2
C3
R4
U2
R3
U1
R1
POWER BOARD ASSY
575-1701
TS1
U5
C2
K2
F4
3A
250V
U4
U3
CR1
J1
10
11
12
R12
R11
R5
R6
R10
K1
F3
3A
250V
F2
3A
250V
1
2
3
4
5
6
7
8
C1
R13
+
+
−
CR5
1
2
3
TS2
F1
1.5A
250V

Figure 6-27, Power Control Board

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-27- 1	575-7700	POWER CONTROL BOARD (UNASSEMBLED)	1
2	90283	IC MOC3021 (MOTOROLA), U1,U2	2
3	88620	IC 4N37, (MOTOROLA) U4,5	2
4	88616	IC 74C14 (NATIONAL), U3	1
5	88164	IC 7812 LM340T (NATIONAL), U6	5
6	R003-101	RESISTOR, 1/2 W, 5%, 100, R1,2	2
7	R003-103	RESISTOR, 1/2 W, 5%, 10K, R5,6	2
8	R003-173	RESISTOR, 1/2 W, 5%, 47K, R3,4	2
9	R003-56	RESISTOR, 1/2 W, 5%, 56, R10	1
10	R005-152	RESISTOR, 1/2 W, 5%, 1.5K, R9	1
11	R003-27	RESISTOR, 1/2 W, 5%, 27, R11,12	2
12	Not Used		
13	R011-1002	RESISTOR, 5 W, 3%, 10000, R7,8	2
14	Not Used		
15	83492	DIODE, IN4005, CR1	1
16	84329	RECTIFIER, Bridge, CR5	1
17	91300	CAP. 6800, Micro-Farad 25V, C1	1
18	91180	CAP., .1 Micro-Farad, 25V, C3	1
19	83999	CAP., .39 Micro-Farad, 50V, C2	1
20	92163	RELAY, FRL2630012/02 (LECTRO COMPONENTS) K1,2	2
21	92164	RELAY, Socket, 23P202 (LECTRO COMP.)	2
22	92165	SPRING, Relay	2
23	91531	CONNECTOR, MR II, AJ1	1
24	87957	TERMINAL STRIP, 8 Pin, ATS1	1
25	87977	TERMINAL STRIP, 3 Pin, ATS2	1
26	88795	CLIP, Fuse, F1-F4	8
27	86091	FUSE, 1.5A, F1	1
28	85137	FUSE, 5A, F2-4	3
29	84358	TERMINAL, Lug, 160-1026-02 (HALLMARK), F2-4	4
30	568-7030	SPACER, .500"	6
31	82764	ADHESIVE, Loctite	A/R
32	80397	SCREW, PH, 4-40 x .312	1
33	80288	NUT, 4-40	1
34	8376	WASHER, INT. T. #4	1
35	9388	SCREW, PH, 2-56 x .250	4
36	8377	WASHER, INT. T. #2	4
37	8259	NUT, Hex #2	4
38	K	WIRE, 24 AWG	A/R
39	575-19701	SCHEMATIC, Power Control	0
40	ES6293	ENGINEERING SPEC	0
41	90031	SEALANT, Silicone	A/R
42	88215	GREASE, Thermo. Conduct	A/R

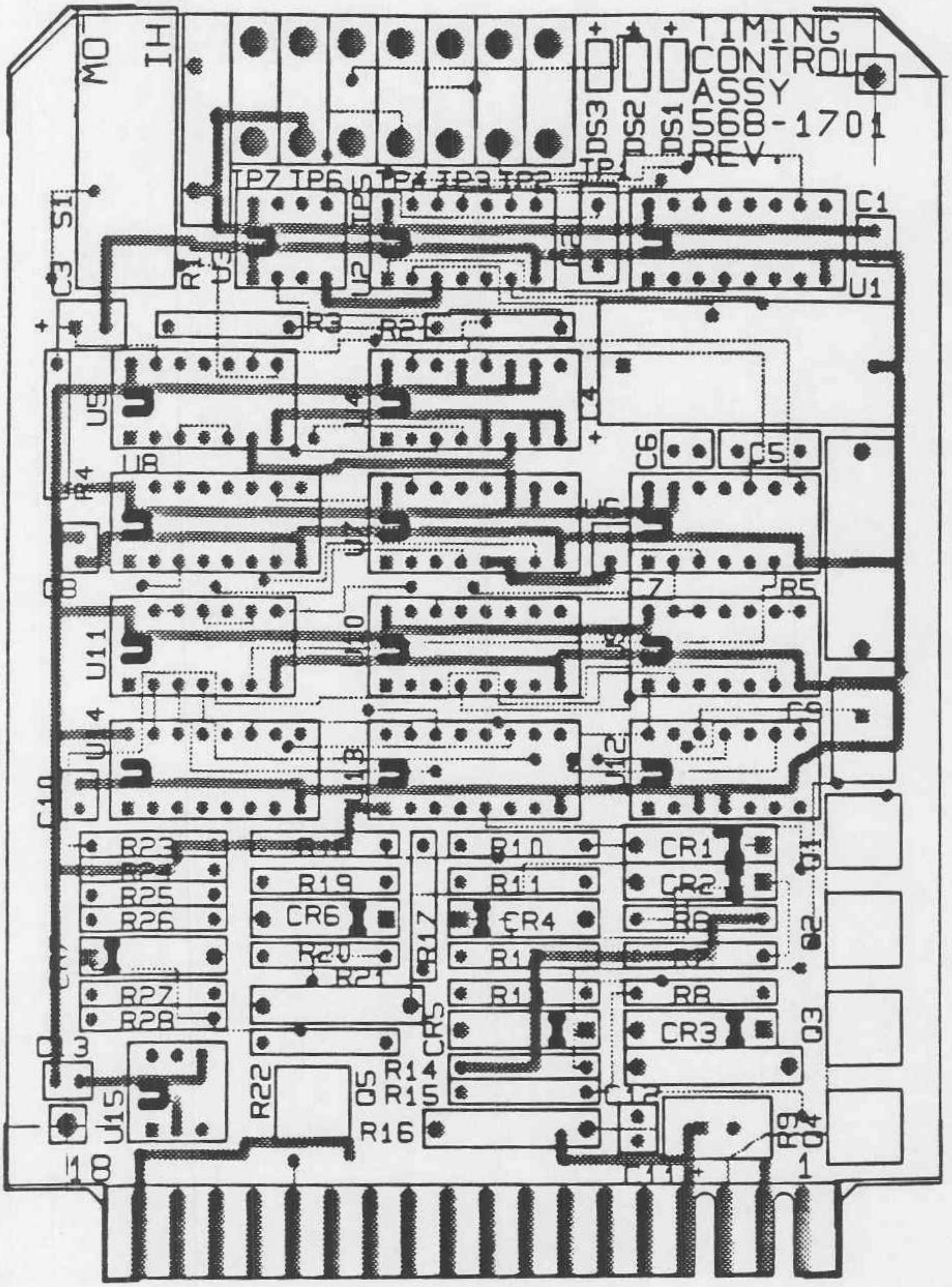

TIMING
CONTROL
ASSY
568-1701
REV.
DS3
DS2
DS1
MO
IH
TP7
TP6
TP5
TP4
TP3
TP2
TP1
S1
C3
R1
U3
U2
C2
C1
U1
R3
R2
C4
U5
U4
C6
C5
U8
R4
U6
U7
C8
C7
R5
U11
U10
U14
U13
U12
C10
R23
R10
CR1
Q1
R25
R19
R11
CR2
R26
CR6
CR4
Q2
R17
R20
R21
R8
R27
R28
CR5
CR3
Q3
R22
Q5
R14
R15
R16
U15
R9
Q4
18
1

Figure 6-28, Timing Control Board

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-28- 1	575-1704	TIMING CONTROL BOARD, REV B	1
2	84541	EJECTOR CARD	1
3	87240	IC NE55P (TI), U3	1
4	87579	IC CD4020BE (RCA) U1,8,10,14, U2	4
5	90600	IC CD4023BE (RCA) U2,6	2
6	87954	IC CD4011BE (RCA) U5,9,11	3
7	88437	IC CD4049BE (RCA) U13	1
8	88435	IC CD4027BE (RCA) U4,7	2
9	88620	IC 4N37 98303 (MOTOROLA) U15	1
10	91488	IC CS166 8344, U12	1
11	R002-103	RESISTOR, 1/4 W, 5%, 10K, R27	1
12	R002-273	RESISTOR, 1/4 W, 5%, 27K, R3	1
13	R002-10	RESISTOR, 1/4 W, 5%, 10, R2	1
14	R002-203	RESISTOR, 1/4 W, 5%, 20K, R6,7,12,14, 20,24	7
15	R002-152	RESISTOR, 1/4W, 5%, 1.5K, R26	1
16	R002-104	RESISTOR, 1/4 W, 5%, 100K, R25	1
17	R002-823	RESISTOR, 1/4 W, 5%, 82K, R4,23	2
18	R002-302	RESISTOR, 1/4 W, 5%, 3K, R15,22,28	3
19	R002-101	RESISTOR, 1/4 W, 5%, 100, R8	1
20	R002-681	RESISTOR, 1/4 W, 5%, 680, R10,11,13, 17,19	5
21	R003-221	RESISTOR, 1/2 W, 5%, 220, R21	1
22	R003-27	RESISTOR, 1/2 W, 5%, 27, R16	1
23	R003-511	RESISTOR, 1/2 W, 5%, 510, R9	1
24	R004-151	RESISTOR, 1 W, 5%, 150, R5	1
25	87596	POT. 89HR10K3, 10K (BECKMAN) R1	1
26	85421	TRANSISTOR, 2N2907, Q1-5	5
27	83492	DIODE, IN4005, CR3,7	2
28	85193	DIODE, IN4742, CR1,2,4,5,6	5
29	88505	LED, 555-2001 (DIALIGHT) DS1-3	3
30	86231	CAPACITOR, 10 MF, 20V, C9,11	2
31	86228	CAPACITOR, 1 MF, 35V, C3	1
32	89518	CAPACITOR, 68 MF, 50V, C4	1
33	91180	CAP., .1 MF, 25V, C1,6,7,8,10,12,13	7
34	86288	CAPACITOR, .01 MF, 25V, C2,5	2
35	84817	RECEPTACLE, Test Probe, BRN 3-582340-1 (AMP), TP1	1
36	84818	REC Test Probe RED 3-582340-2(AMP)TP2	1
37	84819	REC Test Probe ORG 3-582340-3(AMP)TP3	1
38	84820	REC Test Probe YEL 3-582340-4(AMP)TP4	1
39	84821	REC Test Probe GRN 3-582340-5(AMP)TP5	1
40	84822	REC Test Probe BLU 3-582340-6(AMP)TP6	1
41	84823	REC Test Probe VIO 3-582340-7(AMP)TP7	1
42	85747	PAD, Transistor	5
43	88864	BAG, Velostat	1
44	86068	SWITCH CHSF6TCX392 (KEY COMPONENTS)	1
45	575-19704	SCHEMATIC, Timing Control	0
46	ES-6295	ENGINEERING SPEC	0
47	KX	WIRE, 30 AWG	A/R

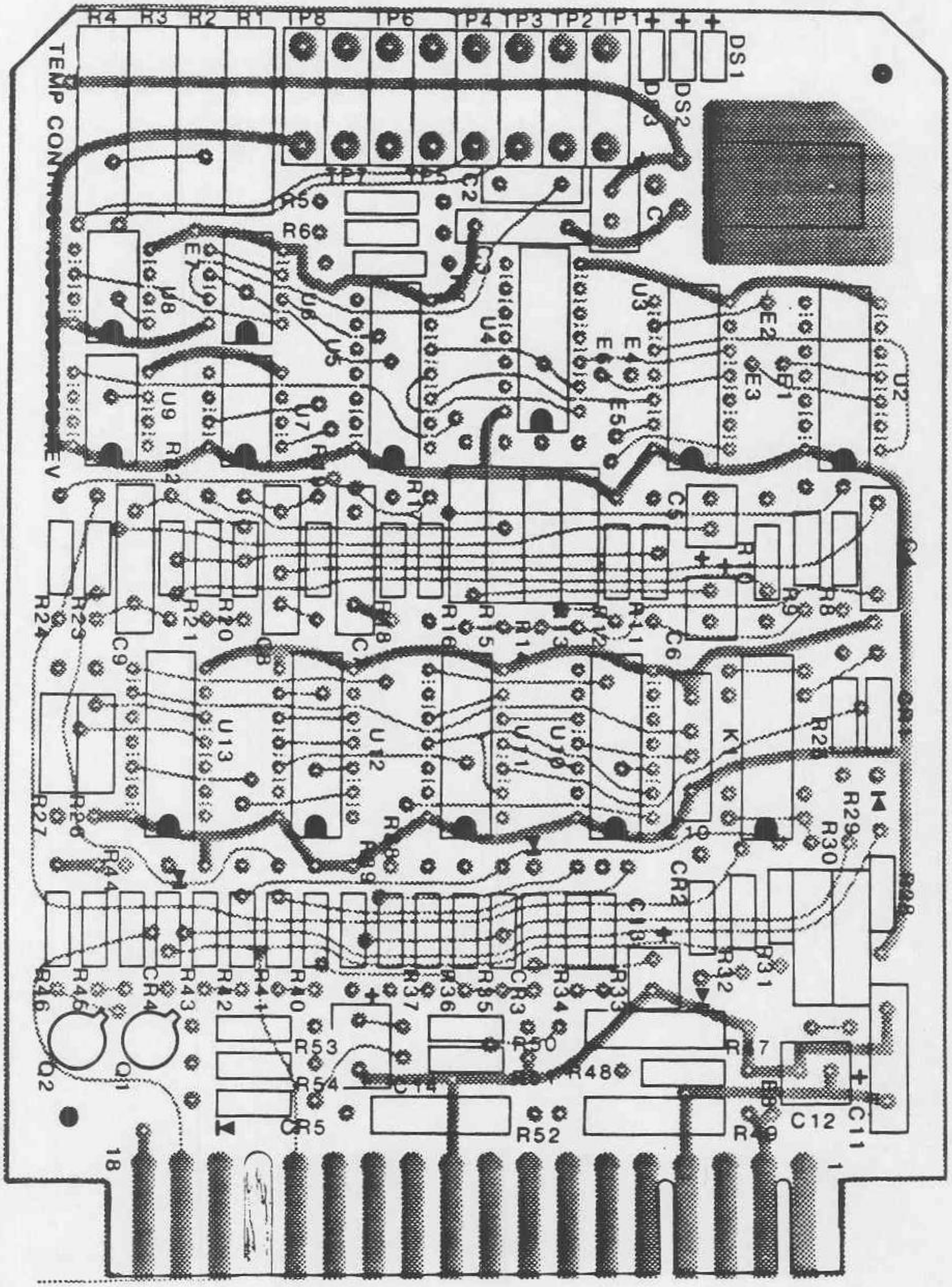

R4
R3
R2
R1
TP8
TP6
TP4
TP3
TP2
TP1
DS1
DS2
DS3
TEMP CON
REV
TP7
TP5
C2
C3
R5
R6
E7
U8
U6
U5
U4
U3
E4
E6
E5
E2
E3
E1
U2
U9
U7
R17
C5
R10
R9
R8
R24
R23
R21
R20
C8
C7
R18
R16
R15
R14
R13
R12
R11
C6
C9
U13
U12
U11
U10
K1
R29
R30
R27
R26
R44
CR2
C10
R46
R45
CR4
R43
R42
R41
R40
R37
R36
R35
CR3
R34
R33
R32
R31
Q2
Q1
R53
R54
C14
R50
R48
C12
C11
CR5
R52
18
1

Figure 6-29, Temperature Control Board

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-29- 1	568-7702	TEMPERATURE CONTROL BOARD, REV B	1
2	34541	EJECTOR CARD	1
3	88426	IC CD4001BE (RCA), U3,10,11	3
4	88427	IC CD4002BE (RCA), U12	1
5	92032	IC CD4093BE (RCA), U4	1
6	88434	IC CD4024BE (RCA), U2,5	2
7	91563	IC LM358N (MOTOROLA), U6,7,8	3
8	90098	IC 394AL (NATIONAL), U9	1
9	87555	IC LM3900N (TI), U13	1
10	88164	IC 7812C (TI), U1	1
11	R002-101	RESISTOR, 1/4 W, 5%, 100, R25,51	2
12	R002-331	RESISTOR, 1/4 W, 5%, 330, R36	1
13	R002-102	RESISTOR, 1/4 W, 5%, 1K, R44	1
14	R002-302	RESISTOR, 1/4 W, 5%, 3K R48	1
15	R002-182	RESISTOR, 1/4 W, 5%, 1.8K, R42	1
16	R002-392	RESISTOR, 1/4 W, 5%, 3.9K, R45	1
17	R002-512	RESISTOR, 1/4 W, 5%, 5.1K, R8,32	2
18	R002-103	RESISTOR, 1/4 W, 5%, 10K, R34,11, 17, 18,20,23,33	7
19	R002-153	RESISTOR, 1/4 W, 5%, 15K, R31,35	2
20	R002-203	RESISTOR, 1/4 W, 5%, 20K, R10,38,46, 53,54	5
21	R002-273	RESISTOR, 1/4 W, 5%, 27K, R19,39	2
22	R002-473	RESISTOR, 1/4 W, 5%, 47K, R12,40,43	3
23	R002-224	RESISTOR, 1/4 W, 5%, 220K, R50	1
24	R002-514	RESISTOR, 1/4 W, 5%, 510K, R5	1
25	R002-105	RESISTOR, 1/4 W, 5%, 1M, R6	1
26	R002-205	RESISTOR, 1/4 W, 5%, 2M, R7,21,24	3
27	R002-513	RESISTOR, 1/4 W, 5%, 1K, R28,37	2
28	R002-222	RESISTOR, 1/4 W, 5%, 2.2K, R41	1
29	R002-154	RESISTOR, 1/4 W, 5%, 150K, R22	1
30	R002-823	RESISTOR, 1/4 W, 5%, 82K, R9	1
31	R003-27	RESISTOR, 1/2 W, 5%, 27, R27	1
32	R003-331	RESISTOR, 1/2 W, 5%, 330, R26	1
33	R021-5230	RESISTOR, 1/4 W, 1%, 523, R49	1
34	R021-5901	RESISTOR, 1/4 W, 1%, 5.9K, R52	1
35	R021-3012	RESISTOR, 1/4 W, 1%, 30.1K, R16	1
36	R021-6192	RESISTOR, 1/4 W, 1%, 61.9K, R13	1
37	R021-1243	RESISTOR, 1/4 W, 1%, 124K, R14	1
38	R021-2493	RESISTOR, 1/4 W, 1%, 249K, R15	1
39	R021-3830	RESISTOR, 1/4 W, 1%, 383, R47	1
40	R021-3161	RESISTOR, 1/4 W, 1%, 3160, R29	1
41	R021-5492	RESISTOR, 1/4 W, 1%, 54.9K, R30	1
42	89390	POT, 89PHR500 500OHM (BECKMAN) R3,4	2
43	87596	POT, 89PHR10K3 10KOHM (BECKMAN) R1,2	2
44	85421	TRANSISTOR, 2N2907, Q1,2	2
45	83492	DIODE, IN4005, CR1,2,3,5	4
46	83257	DIODE, IN758, CR4	1

Fig. & Index No.	Part No.	Description	Units Per Assembly
6-29		TEMPERATURE CONTROL BOARD, Continued	
47	568-7702	LED 555-2001 (DIALIGHT) DS1,2,3	3
48	88505	CAP, .01 Micro-Farad, 25V, C2	1
49	86288	CAP, .05 Micro-Farad, 100V, C4	1
50	86372	CAP, .1 Micro-Farad, 25V, C3,7-11	6
51	86226	CAP, 1 Micro-Farad, 35V, C1,5,6,13	4
52	86228	CAP, 10 Micro-Farad, 20V, C12	1
53	86231	CAP, 10 Micro-Farad, 25V, C14	1
54	89494	RELAY 714 D12/2AS, 12V, K1	1
55	88356	RECEPTACLE, Test Probe, BRN, 3-582340-1 TP1	1
56	84817	REC, Test Probe, RED 3-582340-2, TP2	1
57	84818	REC, Test Probe, ORG 3-582340-3, TP3	1
58	84819	REC, Test Probe, YEL 3-582340-4, TP4	1
59	84820	REC, Test Probe, GRN 3-582340-5, TP5	1
60	84821	REC, Test Probe, BLU 3-582340-6, TP6	1
61	84822	REC, Test Probe, VIO 3-582340-7, TP7	1
62	84823	REC, Test Probe, GREY 3-582340-8, TP8	1
63-64	84824	Not Used	
65	85747	TRANSISTOR PAD	2
66	80397	SCREW, 4-40 x .312	1
67	8376	WASHER, #4, INT. T. TH.	1
68	80288	NUT, Hex, 4-40	1
69-71		Not Used	
72	GH	WIRE, E1-E2; E4-E5; E7-E8	A/R

Section 7
Accessories

AFP 14X-3
X-Ray Processor

Introduction

This section covers the installation and use of optional accessories that are available for the *AFP 14X-3* radiographic film processor.

Accessories that may have been included with your *AFP 14X-3* processor, or ordered as an accessory include the following:

Base Cabinet Accessory	525-180-13
Darkwall Panel Kit	999-230-1203
All Temp. Water Filter	58-199
Daylight Film Loading Kit	990-230-1702
External Wash Water Recirculation Kit	999-230-1707

It is recommended that you file the instructions shipped with each of these accessories with this part of your manual.

External Wash Water Recirculation Kit

The purpose of the external wash water recirculation kit is to enable operation of the *AFP 14X-3* radiographic film processor free of external water supply requirements.

Installation, Wash Water Recirculation System

The wash water recirculation system consists of the following parts:

1. 30 gallon water reservoir.
2. Wash Water recirculation pump
3. 6' water supply hose.
4. 6' drain hose.

The *AFP 14X-3* is shipped with the wash water recirculation pump installed and wired. It is located on the left side of the processor, under the wash tank. See Figure 7-1.

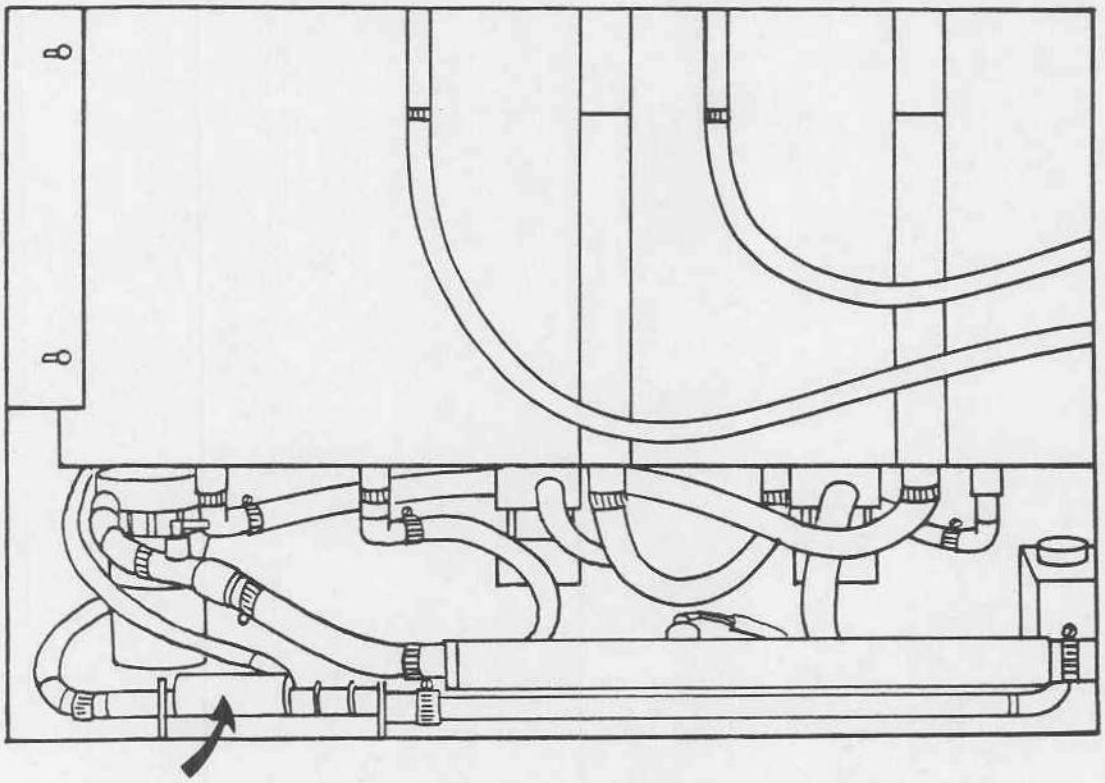


Figure 7-1, Wash Water Recirculation Pump

Installation, Continued

1. Position the 30 gallon reservoir to one side of the processor.

2. Connect the water supply line from the front lower left corner of the processor to the fitting on the end of the reservoir. See Figure 7-2.

3. Connect the drain hose to the wash tank overflow fitting, located next to the drain manifold fitting, on the front lower right corner of the processor, and route its open end to the opening on the top of the reservoir. See Figure 7-2.

   Note: Do Not connect the output of the drain manifold to the wash reservoir. This will contaminate wash water with chemical overflow.

4. Trim off the end of the drain hose to about 12" longer than that required to reach the reservoir opening. This keeps the drain hose from going below the surface of the water in the reservoir.

5. Pour approximately 1/2 gallon of warm water into the wash tank to prime the pump lines.

6. Fill the water reservoir with approximately 30 gallons of warm water. Check all lines for leaks.

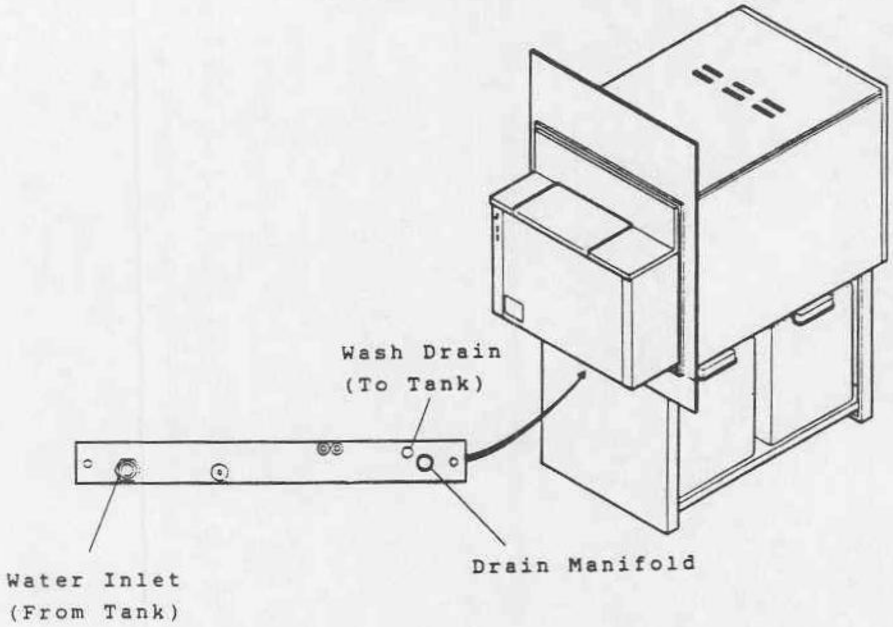


Figure 7-2, Hose Connections

Operation

Operation of the wash water recirculation system is automatic. When power is turned ON the drain valve will close and the circulation pump will run, filling the wash tank.

As film is fed into the processor the recirculation pump will run, pumping wash water from the reservoir into the wash tank. Overflow from the wash tank will flow back into the reservoir to be recirculated.

At shutdown the drain valve will open, draining the entire contents of the wash tank into the chemical drain manifold.

Each day, prior to start-up, the water reservoir must be topped off with fresh warm water, replacing the four gallons drained off at the previous days shutdown.

Maintenance

Maintenance of the wash water recirculation system consists of daily topping up of the water reservoir, periodic changing of the water in the reservoir and routine cleaning.

Depending on the volume of film being run, the wash water in the reservoir will require changing every 3-7 days. Slime or residue on dried film indicates that the reservoir water should be changed.

When changing water, a thorough rinsing of the wash tank, wash rack and water reservoir should be made.

Service

Additional service required by the wash water recirculation system is usually limited to servicing of the pump valves.

After extended periods of use, or through failure to change out the contents of the reservoir on a regular basis, residue can build up on the sealing surfaces of the recirculation pump valves. When this occurs the valves will not seal and the pump will fail to operate. Troubleshoot and service the pump as outlined below.

Cleaning & Servicing the Wash Recirculation Pump

The *AFP 14X-3* processor utilizes a single high reliability, low maintenance oscillating pump to circulate the wash water from its reservoir to the wash tank.

The following steps will correct most problems that may occur.

Pump runs, but delivers little or no water.

1. Verify that the wash water solenoid is operating when the processor is placed in the process mode and that it is clear of debris.

2. Inspect the line(s) between the water reservoir the pump input for kinks or other damage.

3. Water supply and drain must not be lengthened, nor should the water reservoir be positioned, such that more than 36" of lift is required.

4. Pump check valves may be obstructed with debris or crystallized chemistry.

   A) If the pump will move any water, try cleaning the check valves in place by placing the supply hose in a container of warm water, not over 120 degrees F (49 C) and activating the pump by pressing on the *Manual Replenish Switch* or by tripping one of the film detector fingers with film.

   Warm water will usually loosen and rinse out hardened chemical residue.

   B) Stubborn deposits and larger pieces of foreign material may require that the pump be disassembled for cleaning. Figure 7-3 details disassembly of the pumps.

   Clean the valves, using hot water if necessary, to remove any chemical residue. Occasionally valve replacement may be required.

   When assembling take care to install the pump valves exactly as they were removed.

(Continued)

Cleaning & Servicing the Wash Recirculation Pump, Continued

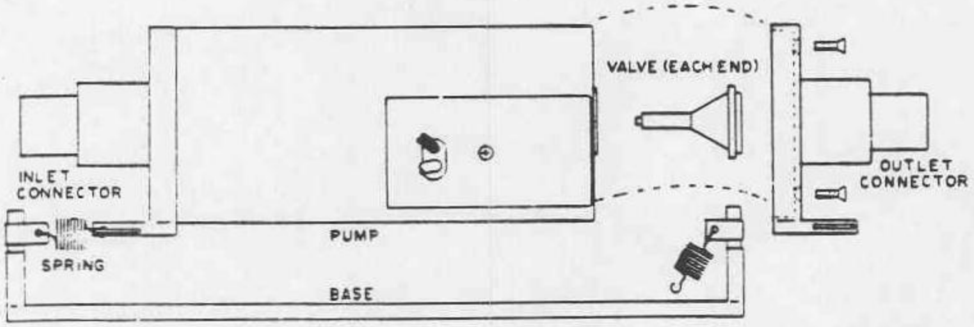

VALVE (EACH END)
INLET CONNECTOR
OUTLET CONNECTOR
SPRING
PUMP
BASE

Figure 7-3, Wash Recirculation Pump

Notes:

Daylight Loader

Introduction

The Daylight Loading Kit (P/N 990-230-1702) is included as standard equipment with some configurations of the ***AFP 14X-3*** and may be added as an option to other ***AFP 14X-3*** processors.

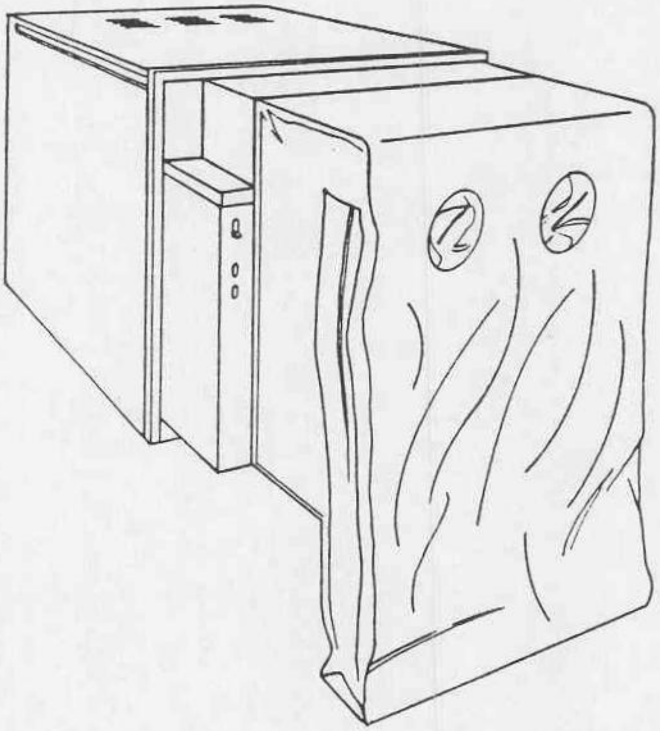


Figure 7-4, *AFP 14X-3* Processor with Daylight Loader Installed

This kit allows the operation of the processor in normal room light, without special darkroom provisions to protect the exposed film.

The kit consists of the following items:

1. Feed Tray Adapter Assembly
2. Bag Support frame assy
3. Frame Support Bars (2)
4. Bag Assembly
5. Table Leaf
6. Lead Lined Cassette Box
7. Attaching Hardware

Installation

In order to properly install and use the Daylight Loader the processor must be installed with the bottom of the processor exactly 21 1/2 inches (54.6 cm) off of the floor. If the optional Base Cabinet Accessory is being used, the processor will be automatically positioned at the correct height.

If not, adjust the height of the processor as required to achieve the 21 1/2" inch (54.6 cm) dimension.

If the processor is currently equipped with a standard feed tray, start with step 1 below. If the processor is already equipped with the Feed Tray Adapter Assembly, start with step 2.

CAUTION: Disconnect the processor from the main power before starting this procedure. The *MAINS* indicator lamp must be OFF before proceeding.

1. Install Feed Tray Adapter.

   A. Remove the top cover and the front cover of the processor.

   B. Remove the 2 screws holding the low level sensor probe cover (Located directly above the first set of film feed rollers) in place and remove the cover.

   C. Remove the three screws holding the feed tray assembly in place:

   One is located in the center of the upper frame member, under the low level sensor probe cover removed above.

   Two others are located at the top left and right corners of the front panel opening

   D. Carefully slide the film feed tray assembly off of the processor frame.

   E. Install the Feed Tray Adapter from the Daylight Loading Kit in place of the original film feed tray. Attach with the three screws previously removed.

   F. Re-install the low level probe cover.

   G. Replace the front panel cover.

Installation Continued

2. Mount Frame Assembly & Daylight Bag

   A. Unfold the assembled bag and support frame assembly and position the top of the support frame (Figure 7-5, Item 1) in place on the feed tray adapter.

   B. Fold back the front edge of the bag to expose the mounting holes and attach the support frame to the feed tray adapter with the 9 pan head machine screws provided. (5 across the top, 2 on each side.)

   C. Open the zippers on each side of the bag and lift the upper frame member (Figure 7-5, Item 2) until it fits into and forms the top part of the bag.

   D. Install the two frame support braces (Figure 7-5, Item 3) by snapping each of them into position as shown.

   D. Fold the work table leaf into position

   E. Install the lead lined box inside the bag, with the latch side of the cover facing towards the processor as shown in Figure 7-5.

   E. The Daylight Loader is now ready for use.

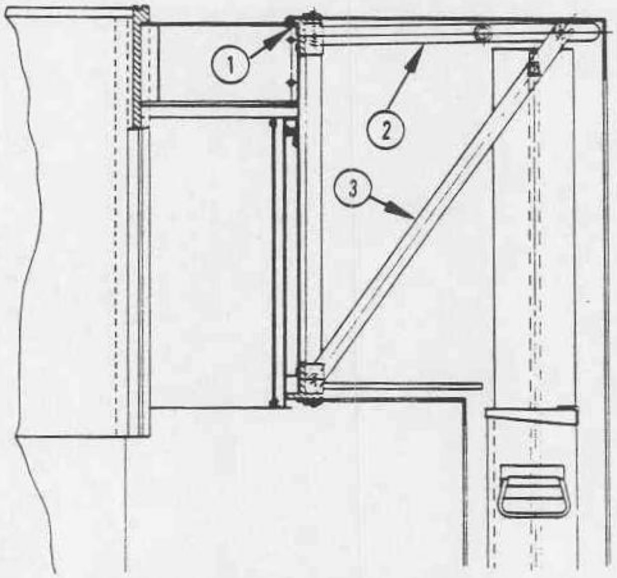


Figure 7-5, Daylight Loader

Operation

The Daylight Loader kit includes a lead lined film box for storage and protection of unexposed film before it is loaded into the exposure cassette(s)

A recommended procedure is as follows:

1. Place a supply of fresh film in the lead lined film supply box. Close and latch the top cover on the lead lined box
2. Place an empty cassette inside the bag on the work table and zip the side openings closed.
3. Reach into the bag through the light tight gloves and load film, from the supply in the lead lined film box, into the cassette. Close and latch the lead lined box after use.

   NOTE: Do Not remove your arms from the light tight gloves while unexposed film is loose in the bag, it will be fogged.
4. Open the side zipper and remove the loaded cassette.
5. Following exposure, place the film cassette(s) inside the bag and close the side zippers.
6. Using the light tight gloves on the front of the bag, reach into the bag, remove a single piece of film from the cassette and feed it into the processor.

   DO NOT remove your arms from the light tight gloves until the film is entirely inside the processor as indicated by the audible "Beeper" or the *TEMP/FEED* light turning OFF.

   Repeat for additional pieces of film.
7. Reload the cassette(s) with fresh film.

Maintenance

There is no need for maintenance other than routine cleaning with a cloth and warm water.

To prevent build up of chemical fumes inside the bad it is recommended that the side zippers be left open when film is not actually being loaded.

Parts

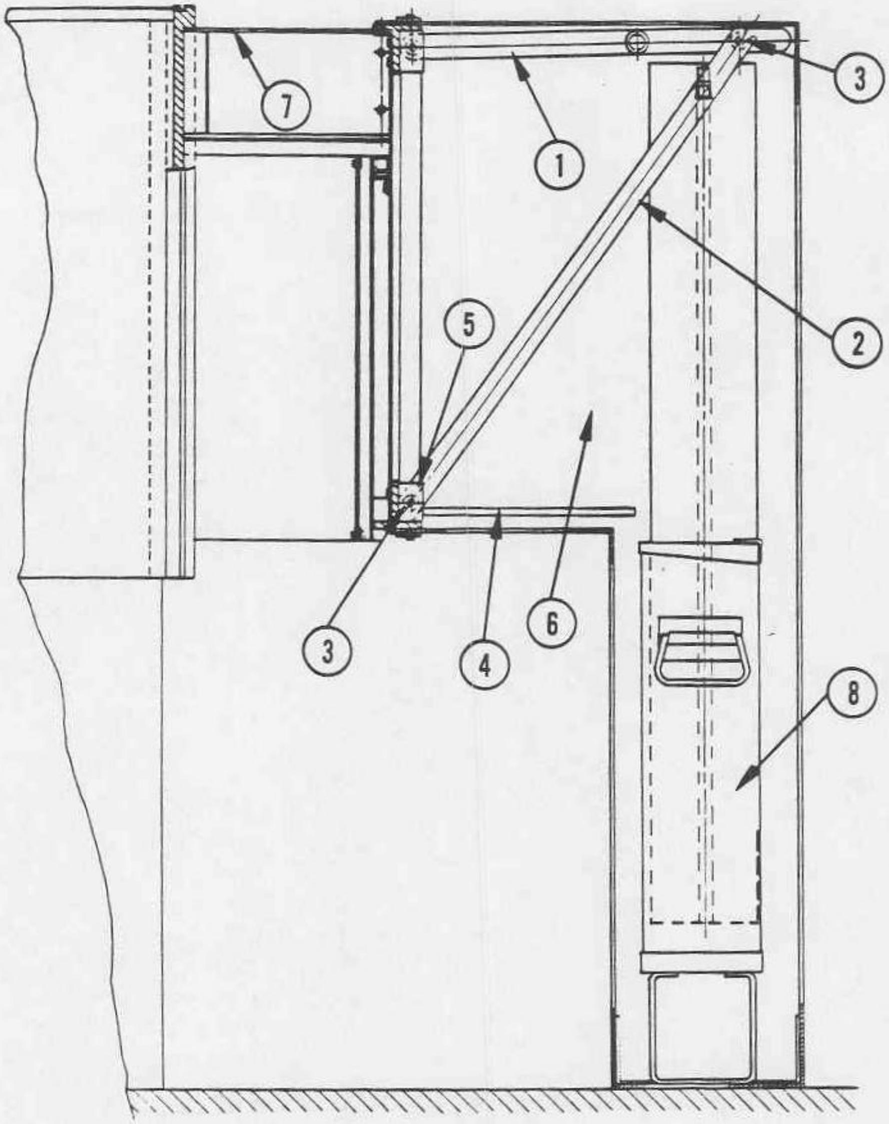


Figure 7-6, Daylight Loader, General Assembly

Fig. & Index No.	Part No.	Description	Units Per Assembly
7-6	990-230-1702	GENERAL ASSEMBLY, Daylight Loader	
7-6-1	000-002-1370	Frame and Daylight Bag Assembly	1
7-6-2	000-002-1371	Brace, Daylight Loader	2
7-6-3	000-002-1374	Pin, Shoulder	4
7-6-4	000-002-1385	Work Table	1
7-6-5	000-002-1698	Hinge, Worktable	1
7-6-6	000-002-0966	Bag Assembly	1
7-6-7	000-002-1381	Shroud Assembly, Feed Tray Adapter	1
7-6-8	000-020-0903	Lead Lined Box	1

Notes: